Borderless Network Switching Update

Pablo Mollinger

Cisco Chile - 2012

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Borderless Networks Access
Catalyst 2K, 3K, 4K Update

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Catalyst 2K/3K/4K Portfolio

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Cisco Borderless Networks Access Portfolio

Catalyst 4500E 4500-X

Industry-leading modular access

Catalyst 3750-X 3560-X

Industry-leading fixed switching

Catalyst 2960-S

Competitive feature set at compelling prices

Catalyst Compact Switches

Great for secure, manageable ports 'at the end of the wire'

Cisco Edge 300*

Open, Lower TCO, All-in-One Access for Connected Rooms

Industrial Automation

Purpose-Built for Industrial Applications

Innovative Services, Lower TCO

Solid Baseline Switching

Right Size Without Compromise

All-in-One Access For Connected Rooms

Ruggedized for Industrial Applications

Next-Generation Workspace

Any Device

HD Video

VDI

Traditional Workspace

Data

Voice

Outside the Wiring Closet

Oil and Gas

Retail

Manufacturing

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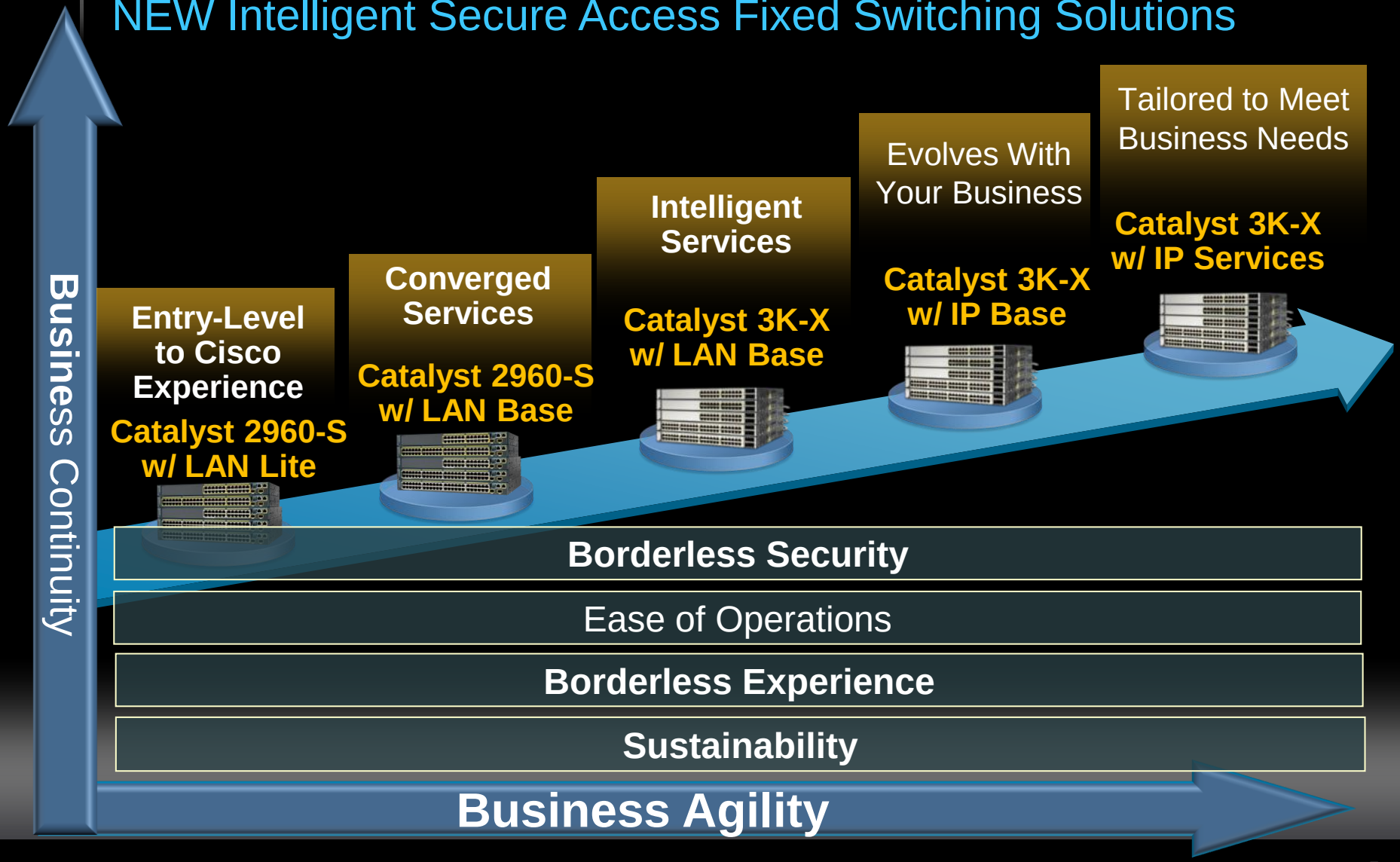
Addressing Business Transformation

NEW Intelligent Secure Access Fixed Switching Solutions



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Catalyst 2960-S

KEY FEATURES

FlexStack

PoE on all 48 ports

PoE+ support

10G uplinks available

Low power consumption

OPERATIONAL SIMPLICITY

Enhanced Limited Lifetime Warranty

Auto Smart Ports

EASE-OF-USE | 20M **PORTS** | 500K+ **UNITS** | **ENERGY EFFICIENCY** | **LOWER TCO**

Cisco Quality at Competitive Price

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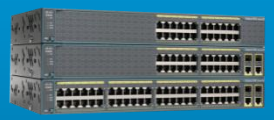
Catalyst 2K Campus Portfolio

ADVANCED LAYER 2 (LAN Base) PORTFOLIO



Catalyst 2960

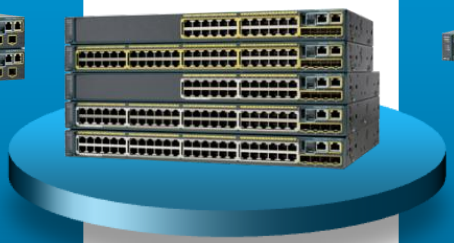
1G Uplinks
Partial PoE
LLW

Catalyst 2960-S

10G/1G Uplinks
FlexStack
Full PoE, Partial PoE+
E-LLW

Fast Ethernet

Gigabit Ethernet



BASIC LAYER 2 (LAN Lite) PORTFOLIO

Catalyst 2960

1G Uplinks
Partial PoE
LLW

Catalyst 2960-S

1G Uplinks
Partial PoE/PoE+
E-LLW

Fast Ethernet

Gigabit Ethernet

FLEXSTACK MODULE

C2960S-STACK

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Catalyst 2960S-FE

Target FCS
Q3CY2012

(Pre-EC)

- L2 Stack on FE (FlexStack)
- PoE on all 48 ports
- PoE+ support
- Full IPv6 Support
- Low Power Consumption
- Enhanced Limited Lifetime Warranty

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SKU Comparisons

2960 SKUs

	Model	1G SFP Ports	10/100/ 1000 Ports	10/100 Ports (Downlink)	Available PoE Power
LAN Base	WS-C2960-48PST-L	2	2	48	370W
	WS-C2960-48TC-L	2 dual purpose		48	
	WS-C2960-48TT-L		2	48	
	WS-C2960-24PC-L	2 dual purpose		24	370W
	WS-C2960-24LT-L		2	24	124W
	WS-C2960-24TC-L	2 dual purpose		24	
	WS-C2960-24TT-L		2	24	
LAN Lite	WS-C2960-48PST-S	2	2	48	370W
	WS-C2960-48TC-S	2 dual purpose		48	
	WS-C2960-48TT-S		2	48	
	WS-C2960-24TC-S	2 dual purpose		24	
	WS-C2960-24PC-S	2 dual purpose		24	370W
	WS-C2960-24LC-S	2 dual purpose		24	124W
	WS-C2960-24-S			24	

2960S-FE SKUs requested

	Model	Flex Stack Stacking	1G SFP Ports	10/100 Ports	Available PoE Power
LAN Base	WS-C2960S-F-48FPS-L	√	4	48	740W (PoE+/PoE)
	WS-C2960S-F-48LPS-L	√	4	48	370W (PoE+/PoE)
	WS-C2960S-F-48TS-L	√	4	48	
	WS-C2960S-F-24PS-L	√	2	24	370W (PoE+/PoE)
	WS-C2960S-F-24TS-L	√	2	24	
LAN Lite	WS-C2960S-F-48TS-S		2	48	
	WS-C2960S-F-24TS-S		2	24	

Note: FlexStack Module will be same list price as 2960-S: Will be different sku, but same hardware and will interoperate with 2960-S

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Anuncios EoS – Cat 2960

2960G 24/48 ports → Reemplazo 2960S

EoS Date: 31 Julio 2012

http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps6406/end_of_life_c51-674040.html

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Enterprise Class Catalyst 3750-X and 3560-X

INNOVATION

StackWise Plus and StackPower
Flexible NetFlow
Hot-swappable power supplies & fans
Industry's highest density PoE+
Rolling Stack Upgrades
MACSec

OPERATIONAL SIMPLICITY

Automation
Investment protection
Enhanced Limited Lifetime Warranty

WORLD'S MOST POPULAR STACKABLE | ¼ BILLION PORTS | OVER 7 MILLION UNITS | **INDUSTRY LEADERSHIP** | **LOWER TCO**

Leading Stackable Unified Access Platform

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StackPower
Main features

Industry Leadership

- Innovative technology, aggregates and shares available input power capacity in a Stack
- Flexible arrangement of power supplies in a stack
  - –Up to 8.8Kw power in a stack
- Supports a “zero-footprint” RPS deployment
- Intelligent power shedding
- Stackpower decouples a PS from its physical location in the stack!
- Up to 4 switches can be part of Stackpower
  - –Independent from Stackwise (Stackwise Plus)
- No need for RPS though an XPS is available!

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StackPower Close up

Console, 10/100 port, and USB type A

Stackwise Plus
4 Switches

FRU Dual
Redundant Fans

StackPower
Cables

Redundant, Dual PS, either
AC/AC, AC/DC, AC, or DC
combinations

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Catalyst 3K Campus Portfolio

Stackable Switch Portfolio

Catalyst 3750 v2

Data or PoE
StackWise
Fixed 1G Uplinks
Single PS
LLW

Catalyst 3750-X

Data / PoE(+)
StackWise Plus
StackPower
Modular 1G/10G Uplinks
Dual PS
E-LLW

Fast Ethernet | Gigabit Ethernet

Stand-Alone Switch Portfolio

Catalyst 3560 v2

Data or PoE
Fixed 1G Uplinks
Single PS
LLW

Catalyst 3560-X

Data / PoE(+)
Modular 1G/10G Uplinks
Dual PS
E-LLW

Fast Ethernet | Gigabit Ethernet

Network And Service Modules

C3KS-NM-1G C3KS-NM-10G

C3KS-NM-10GT

NEW

C3KS-SM-10G

Aggregation Switch

WS-C3750X-12S-S WS-C3750X-24S-S
WS-C3750X-12S-E WS-C3750X-24S-E

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Catalyst 3K - Service Module

Product Number	Product Description
C3KX-NM-1G	Four GbE port network module
C3KX-NM-10G	Two 10GbE SFP+ ports network module with four physical ports with two SFP+ and two regular SFP ports
C3KX-NM-10GT	Two 10GB-T ports network module
C3KX-SM-10G NEW	Service Module with two 10GbE SFP+ ports network module for Netflow and MACsec encryption

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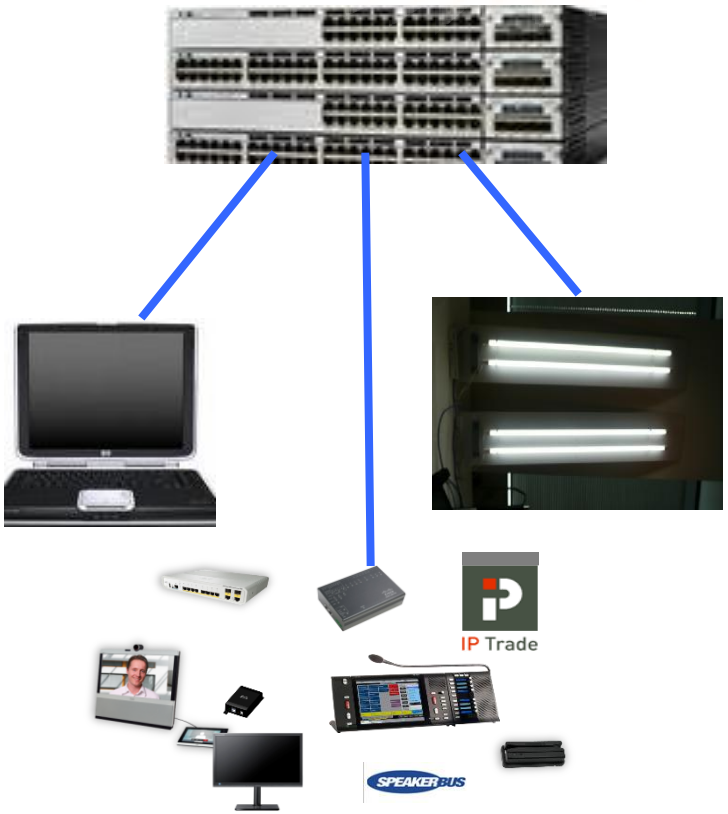
UPOE on Catalyst 3K-X

Target FCS
CY2012 End

- New 24 and 48 port HW SKUs
- UPOE - 60W power per port on 24 ports.
- EEE PHYs – Energy savings.



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Anuncios EoS – Cat 3560/3750 G/E

3560G/3560E/3750G/3750E → Reemplazo 3560-X/3750-X

Ver aviso de EoS por reemplazo o migracion

EoS Date: 30 Enero 2013

http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps5023/eol_c51-696372.html

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Enterprise Class Catalyst 4500E

INNOVATION

IOS XE Open Application Platform (Wireshark)

In Service Software Upgrade

Flexible NetFlow

Universal PoE

OPERATIONAL SIMPLICITY

Extended Lifecycle of 7–10 Years

Automation

Investment Protection

Limited Lifetime Warranty

848GBPS SYSTEM	100M+ PORTS	700K+ CHASSIS	**INDUSTRY LEADERSHIP**	**LOWER TCO**

Leading Modular Unified Access Platform

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Catalyst 4500E Campus Portfolio

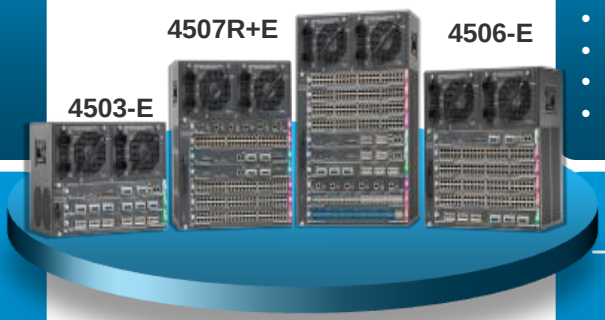
SUPERVISOR ENGINE 7-E

- Optimized for Large Campus
- 848 Gbps Switching Capacity
- 4x10G SFP+/SFP uplinks
- 384 10/100/10000 ports
- 96 10G LC Fiber ports
- 250 MPPS
- 256K Routes

SUPERVISOR ENGINE 7L-E

NEW

- Optimized for Small/Mid Size Campus
- 520 Gbps (48G/slot)
- 2x10G (SFP/SFP+) or 4x1G SFP Uplinks
- 240 10/100/10000 ports
- 60 10G LC Fiber ports
- 225 MPPS
- 64K Routes



FIBER LINE CARD PORTFOLIO

	1G	10G
High Density	WS-X4624-SFP-E	WS-X4712-SFP+E
Low Density	WS-X4612-SFP-E	WS-X4606-X2-E

COPPER LINE CARD PORTFOLIO

	Data Only	PoE+
48G	NEW WS-X4748-RJ45-E	NEW WS-X4748-UPOE+E
24G	WS-X4648-RJ45-E	WS-X4648-RJ45V+E

POWER SUPPLIES

PWR-C45-1300ACV

PWR-C45-2800ACV

PWR-C45-4200ACV

PWR-C45-6000ACV

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Supervisor Comparison

SUPERVISOR	Sup7-E	Sup7L-E
Switch Fabric Capacity	848 Gbps	520 Gbps
CPU	1.5 GHz (dual core)	1.2 GHz (dual core)
Forwarding Rate	250 Mpps	225 Mpps
Bandwidth Per Slot	48 Gbps	48 Gbps
Number of IPv4 Routes	256K	64K
10 GB Port Density	100	62
1 GB Port Density	384	240
Netflow Entries	128K	128K
# of VRFs	64	64
Unicast MAC Table	55K	55K
Chassis Support	3, 6, 7R, 10R chassis	**3, 6, 7R chassis**
Active redundant 10G uplinks	4	**2**
Max DRAM	2G (4 G option)	2G (4 G option)

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Catalyst 4500E—
48p 10/100/1000 RJ45 Line Cards

Leadership with Investment Protection

POE

WS-X4648-RJ45V+E
List $7,495

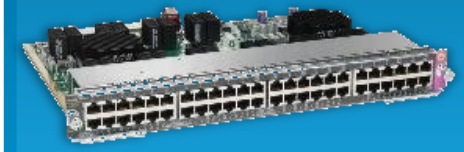
- 30W/ port (IEEE802.3at) on upto 24 ports
- PoE policing and monitoring
- EnergyWise
- Jumbo frame support

Now Shipping

WS-X4748-UPOE+E
List $8,995

- Universal PoE (Intelligent 60W PoE/Port)
- IEEE 802.3az (Energy Efficient Ethernet)
- 30W/ port (IEEE802.3at) on all 48 ports
- PoE policing/ monitoring, EnergyWise, Jumbo frames

DATA



WS-X4648-RJ45-E
List $5,495

- Jumbo frame support

Now Shipping

WS-X4748-RJ45-E
List $6,995

- Jumbo frame support
- IEEE 802.3az (Energy Efficient Ethernet)

2:1 24G/ SLOT

1:1 48G/ SLOT

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Next Generation Access Linecard WS-X4748-UPOE+E

Now Shipping

CISCO UNIVERSAL POE (UPOE)

- 60W PoE with max. line card budget of 1500W
- Estimate cable loss with intelligent diagnostics
- LLDP enhancement to negotiate beyond 30W
- Power X-Generation applications
  - IP Turrets in financial trading floors
  - Integrated Virtual Desktop Clients

ENERGY EFFICIENT ETHERNET

- Compliant with IEEE 802.3az for:
  - 100/1000 Base-T
- Power consumption is based on link utilization
- Green: Save up to 190W per chassis
- Mandatory for Energy Star Compliance*

* Energy Star Requirements for Enterprise Switches Expected to Be Published Mid-2011

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Catalyst 4500E—Fiber Line cards

High Density

Low Density

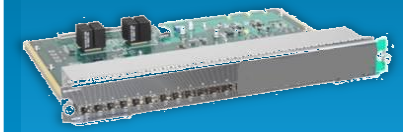
NEW High Performance E-Series Options

WS-X4624-SFP-E

- 24 ports 1:1 non blocking SFP
- 196 ports/ system

WS-X4712-SFP+E

- 12 ports, 2.5:1 10GE
- 1G / 10G flexibility, LRM SFP+



WS-X4612-SFP-E

- 12 ports, 1:1 non blocking SFP
- Granular 12 port increments

WS-X4606-X2-E

- 6 ports, 2.5:1 10G
- 1G / 10G flexibility, LRM X2

1G Fiber

10G Fiber

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Current 4500E PoE/UPOE Bundles

Cisco Catalyst 4500E 10/100/1000 Bundle

NEW

Enable 10GE for FREE, IP Base Upgrade Option
Enterprise Services Upgrade from LAN Base Option

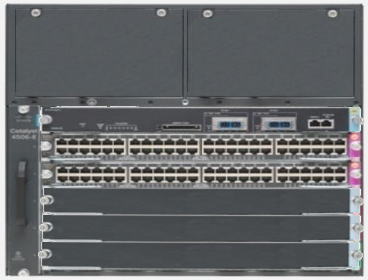
UPOE upgrade option

Upgrade to UPOE
6, 7 and 10 slot Option

Chassis, SUP7L-E
48 Port 10/100/1000 PoEP

C4503-E Bundle
WS-C4503E-S7L+48V+
44% off LP
44% off Services

Chassis, SUP7L-E
96 Port 10/100/1000 PoEP

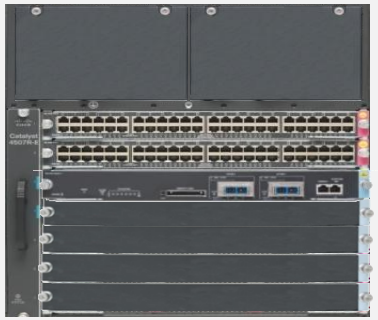


C4506-E Bundle;
WS-C4506E-S7L+96V+
44% off LP
44% off Services

SUP7-E upgrade ($11,000)

↑

Chassis, SUP7L-E
96 Port 10/100/1000 PoEP



C4507R+E Bundle
WS-C4507RE+96V+
35% off LP
54% off Services

Chassis, SUP7-E
96 Port 10/100/1000 PoEP

C4510R+E Bundle
WS-C45010RE-S7+96V+
31% off LP
50% off Services

Services : SMARTnet & SmartFoundation

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Catalyst 4500 PoE Power Supplies

	Input Circuits	Voltage	Circuit Power	PoE Power	Class 3 PD (Max)	30W PD (Max)
PWR-C45-1300ACV	Single	110V/220V	1000W	800W	48	48
PWR-C45-2800ACV	Single	220V	1360W	1400W	84	43
PWR-C45-4200ACV	Dual	110V/220V	1383W	3700W (220V) 1850W (110V)	223 (220V) 111 (110V)	114
PWR-C45-6000ACV	Dual	110/220V	2200W	(220V) 1850W (110V)	289 (220V) 111 (110V)	148

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Catalyst 4500 9,000 Watt PoEP Power Supply

FCS Q3CY2012

Efficient, Flexible, Scalable, Protects Investment

Flexible and Scalable

- Auto-sensing 110V (15A) /220V (20A)
- Up to 2240W Data and 7500W PoE(P) Power
- 1:1 Redundancy
- Powers fully loaded 4510R+E Chassis with Class 3 devices

1HCY12

Energy Efficient

- Highest average efficiency rating for Catalyst 4500 series
- 80 PLUS Platinum Efficiency Standard from 600W to 9000W (90%+ Efficiency at all loads!)
- Measures true power consumption, integrates with EnergyWise

Investment Protection

- Triple Input power supply scales with growth in power needs
- Compatible with E-Series chassis

Input Voltage	Line Connected	Output Power	Max Class 3 PoE	Max PoEP (30W)
220 VAC 20Amp	Single	3000 W	150	77
	Double	6000 W	302	155
	Triple	9000 W	384 (max 10 slot)	232
110 VAC 15Amp	Single	1100 W	42	21
	Double	2200 W	84	43
	Triple	3300 W	126	65

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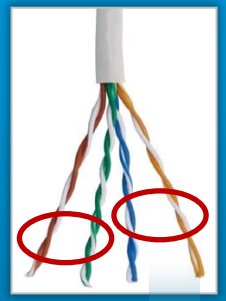
Cisco Universal POE (UPOE)

IEEE 802.3at (PoE+)

Cat5e

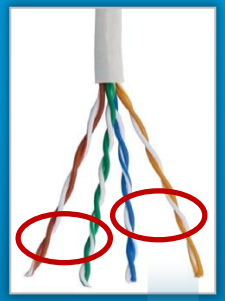


30W

- Maximum power sourced = 30W

UPOE

Cat5e



30W 30W

60W

- Maximum power sourced = 60W
- Supported by all cabling standards
- Compatible with PoE and PoE+

Universal Nature

- Standard RJ45 Connector
- No Cabling Change from PoE+

High Availability

- Uptime for critical apps (e911)
- Low TCO with UPS consolidation

Green

- 10% more efficient than bricks
- Management with EnergyWise

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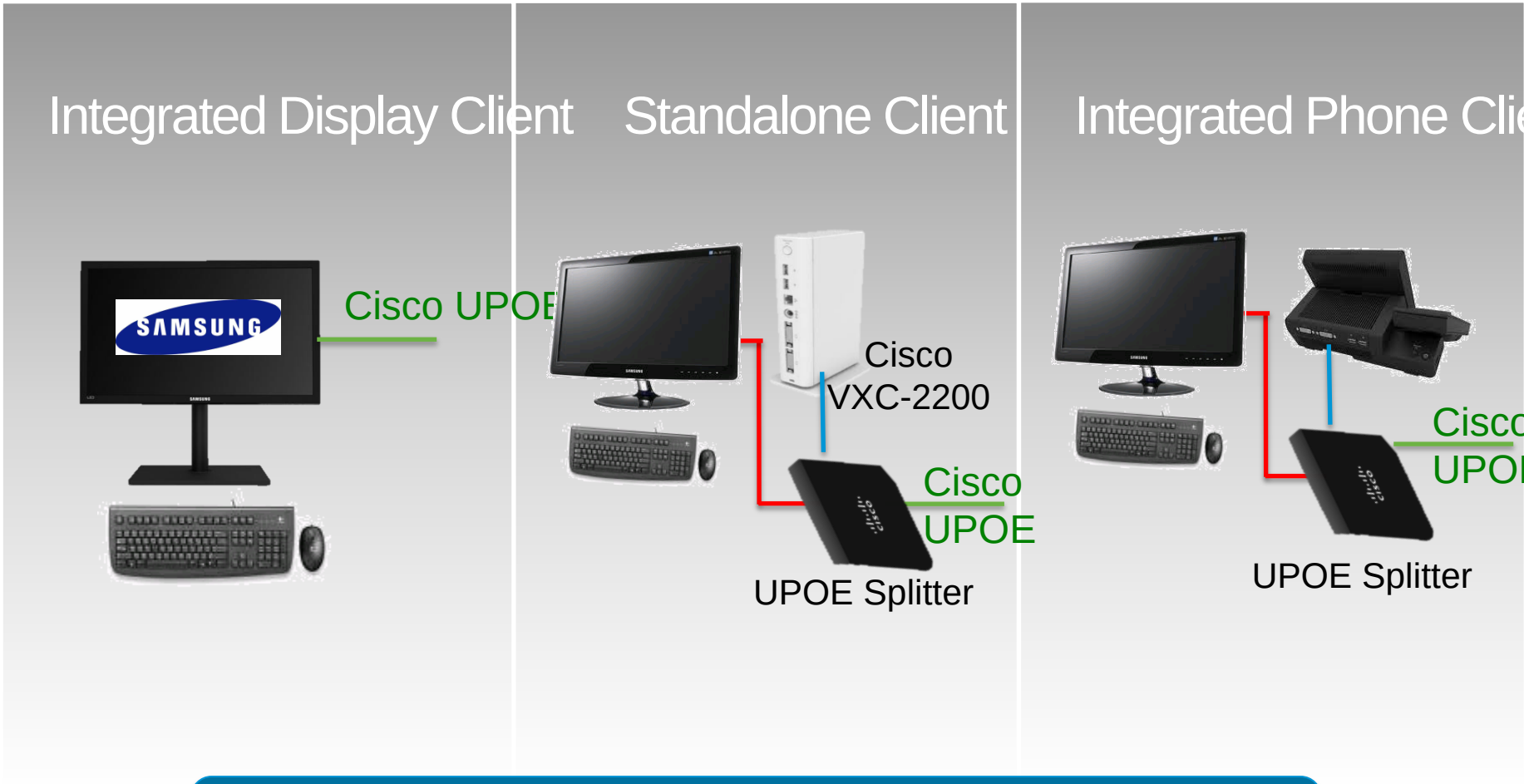
UPOE & Virtual Desktop Clients



Power resiliency for Phone and VDI

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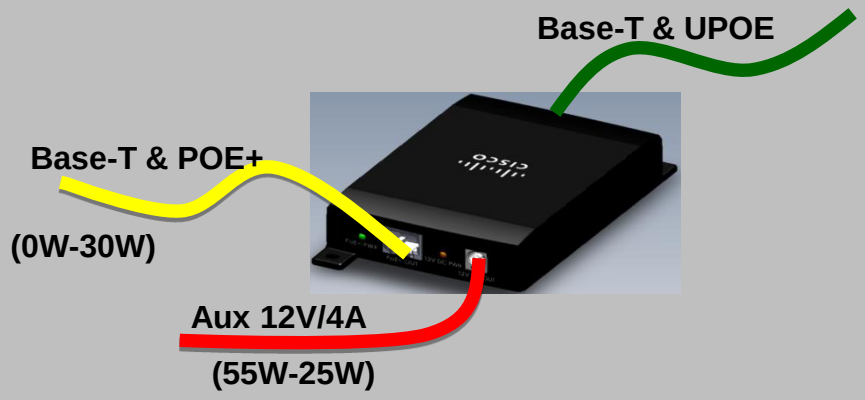
Cisco UPOE Splitter

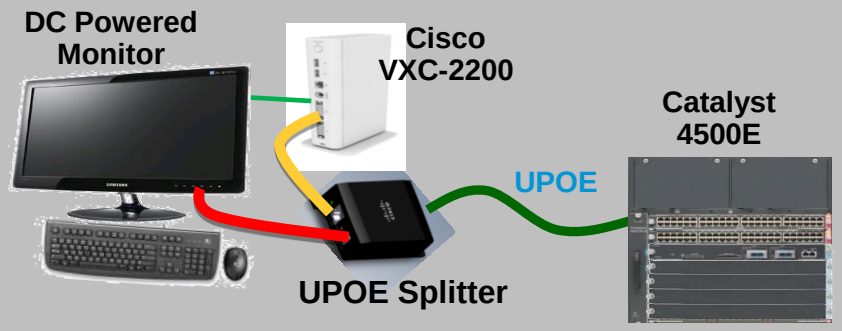
FCS
Q1CY2012



Why Splitter?

- Market Enabler
- Power current devices
- 12V is prevalent Aux DC
- Power passive end points

- **Example using Cisco VXC and a 12V DC Powered Monitor from Samsung**
- **Other applications – building management**



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Catalyst 4500-X Fixed 10 GE Aggregation Switch

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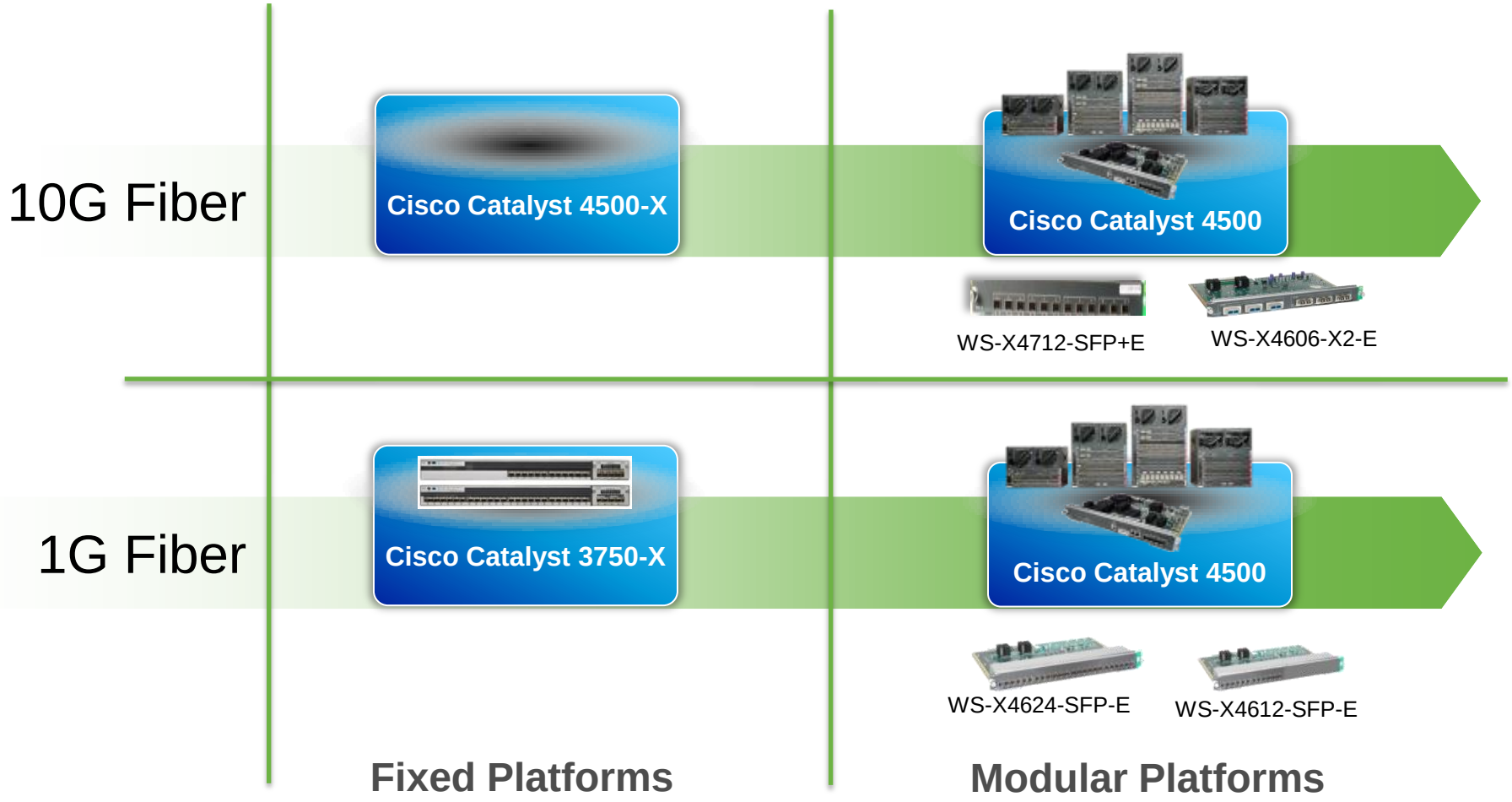
Campus Aggregation Switching Portfolio



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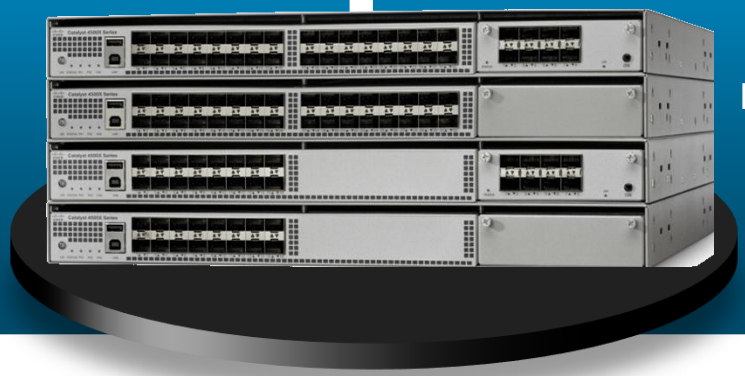
Introducing Catalyst 4500-X

NEW

INNOVATION

- Virtual Switching System (VSS)*
- Flexible NetFlow
- Easy Virtual Network (EVN)
- IOS XE Open Application Platform (Wireshark)
- ISSU, NSF, SSO w/ VSS



OPERATIONAL SIMPLICITY

- Automation
- Investment protection
- Modular 8-port 10GE uplink
- Hot-swappable dual redundant power supplies & five individual fans
- Limited Lifetime Warranty

800 Gbps System 1.6Tbps w/ VSS	Smallest Size – 1RU 21” Deep	Highest Scalability Richest Services	Industry Leadership	Lower TCO

* roadmap

Revolutionizing Fixed 10GE Campus Aggregation Platform

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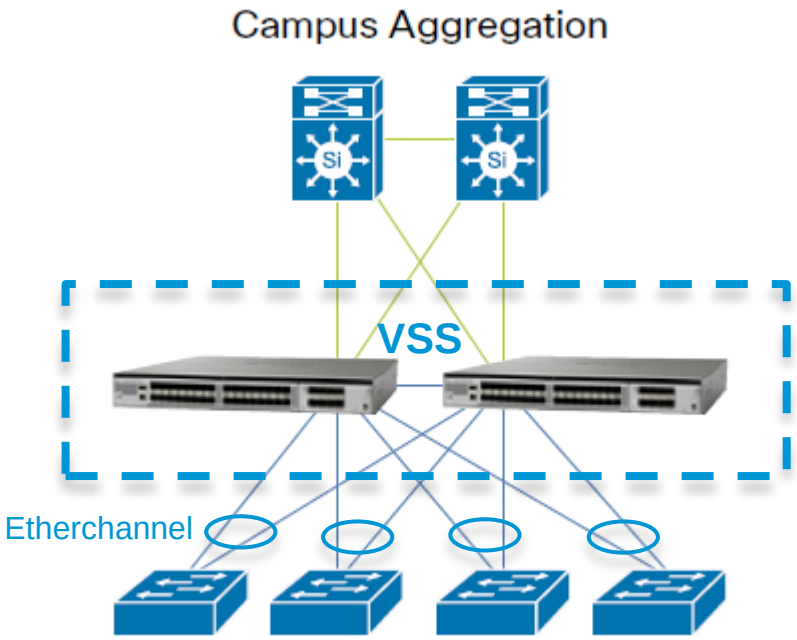
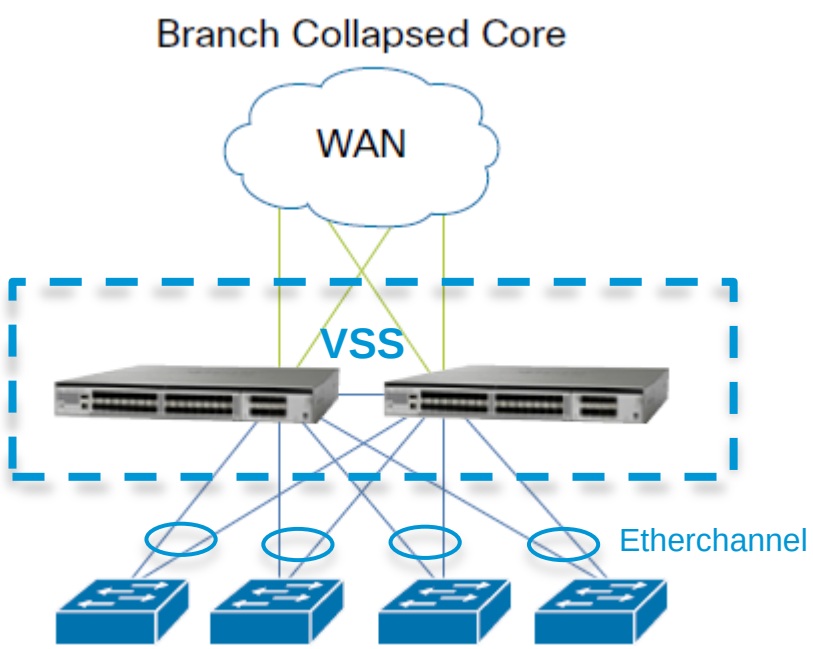
Catalyst 4500-X Typical Deployment





Catalyst 4500-X Advantages:

- 1.6Tbps Switching Capacity with VSS
- Small size – 1RU, 21” deep
- Supports GE SFP and 10 GE SFP+ on any ports
- Low power consumption ~ 330W
- Flexibility for future growth to 40G

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Catalyst 4500-X Aggregation Portfolio

Catalyst 4500-X PORTFOLIO

IP Base SKUs Front to Back Airflow 1x 750WAC P/S	Enterprise Services SKUs w/ 8-port uplink Front to back Airflow 2x 750WAC P/S	IP Base SKUs Back to Front Airflow 1x 750WAC P/S
 WS-C4500X-32SFP+	 WS-C4500X-40X-ES	 WS-C4500X-F-32SFP+
 WS-C4500X-16SFP+	 WS-C4500X-24X-ES	 WS-C4500X-F-16SFP+
Front to Back Airflow Burgandy color fan and P/S handle 		Back to Front Airflow Blue color fan and P/S handle

8-port 10GE Modular Uplink Module
C4KX-NM-8SFP+,

Removable Fan Module,

750WAC Modular P/S,

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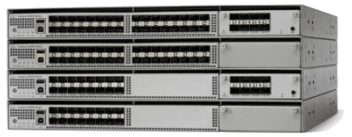
C4500-X Performance and Features



Feature	Catalyst 4500-X
Switching Fabric	~ 800 Gbps
# of 10G Ports	24/40
IPv4/IPv6 Routes	256K/128K (32-port) & 64K/32K (16-port)
MAC Address	55K
ACL Entries	64K
Mcast Routes IPv4/IPv6	32K/32K (32-port) & 24K/12K (16-port)
Egress Buffering	32MB Shared
Depth	21”
App Visibility	128K Netflow Entries
High Availability	VSS*, ISSU, CoPP
Security	TrustSec (MACSec, SGT, SGACL)*
Medianet	Mediatrace, Video Monitoring, MSI Proxy
Management	EEM, IPSLA, Wireshark
Network Virtualization	EVN, VRF-Lite

* roadmap

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Catalyst 4500-X Physical Characteristics

Dual redundant AC/DC P/S and 5 Fans

Airflow vent above the ports for optimal cooling

Burgundy color fan and P/S handles for front to back airflow

Blue color fan and P/S handles for back to front airflow

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C4500-X SKUs

Models	Total 10 GE SFP+ Ports	Default P/S	Airflow/ Cooling	IOS Feature Set
WS-C4500X-16SFP+	16	1	Front-to-back	IP Base
WS-C4500X-F-16SFP+	16	1	Back-to-front	IP Base
WS-C4500X-24X-ES	24 (16+8)	2	Front-to-back	Ent. Services
WS-C4500X-32SFP+	32	1	Front-to-back	IP Base
WS-C4500X-F-32SFP+	32	1	Back-to-front	IP Base
WS-C4500X-40X-ES	40 (32+8)	2	Front-to-back	Ent. Services
C4KX-NM-8SFP+	8			
C4KX-PWR-750AC-R=			Front-to-back	
C4KX-PWR-750AC-F=			Back-to-front	

All models ship with a default P/S and 5 individual Fans with front-to-back or back-to-front airflow
DC P/S is available as an option with any of the switches

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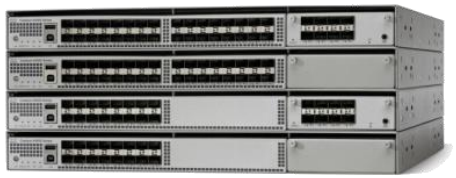
Catalyst 4500-X Release timeline



FCS April 2012

- 32-port 10G Version
- 8-port 10G Uplink
- AC / DC P/S
- N+1 Fan

June 2012

- 16-port 10G Version
- NEBS

Sept 2012

- VSS

Dec 2012

- 2x 40G uplink ports (Roadmap)

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Catalyst Compact Switches

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Catalyst Compact Switches

KEY FEATURES

Can be powered via PoE(+) or UPoE*

Pass through PoE for end devices

Uplink & Downlink Data Encryption*

12 models to choose from

OPERATIONAL SIMPLICITY

Zero-touch deployment

Auto Smart Ports

Enhanced Limited Lifetime Warranty

8 & 12 PORT MODELS

QUIET (FANLESS)

EXTEND THE CISCO NETWORK

FULL-SIZE CAPABILITIES

LOWER TCO

Ideal for Retail Check Stands, Classrooms, Conference Rooms, Hotel Suites, and More

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Catalyst Compact Switch Portfolio

3560-C IP BASE PORTFOLIO

ADVANCED LAYER 2
(LAN Base) PORTFOLIO

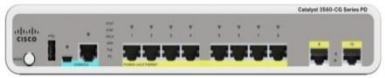
3560-C Portfolio

IP Base 8 and 12 port FE Data or PoE+ 2 x 1G Uplinks E- LLW	IP Base 8 port GE Data or PoE+ 2 x 1G Uplinks E- LLW
Fast Ethernet	Gigabit Ethernet

2960-C Portfolio

LAN Base 8 and 12 port FE Data or PoE 2 x 1G Uplinks E- LLW	LAN Base 8 port GE Data Only 2 x 1G Uplinks E- LLW
Fast Ethernet	Gigabit Ethernet

PoE Pass Through Switch



WS-C3560CPD-8PT-S

WS-C2906CPD-8PT-L

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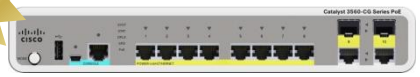
New Cisco 3560-C Compact Switches
Access Extension for Borderless Networks

3560-C PD/PSE

8 10/100/1000 PoE ports
2 PoE+ input ports

3560-C GE PoE+



8 10/100/1000 PoE+ ports
2 GE uplink ports

3560-C FE PoE+

8 10/100 PoE+ ports
2 PoE+ GE input ports

3560-C GE

8 10/100/1000 ports
2 GE uplink ports

3560-C Fe PoE+

12 10/100 PoE+ ports
2 GE uplink ports

Key Benefits:

- ✓ Reduce Infrastructure
- ✓ Speed Deployments
- ✓ Ease Operations
- ✓ Secure LAN Edge
- ✓ Lower Energy Use

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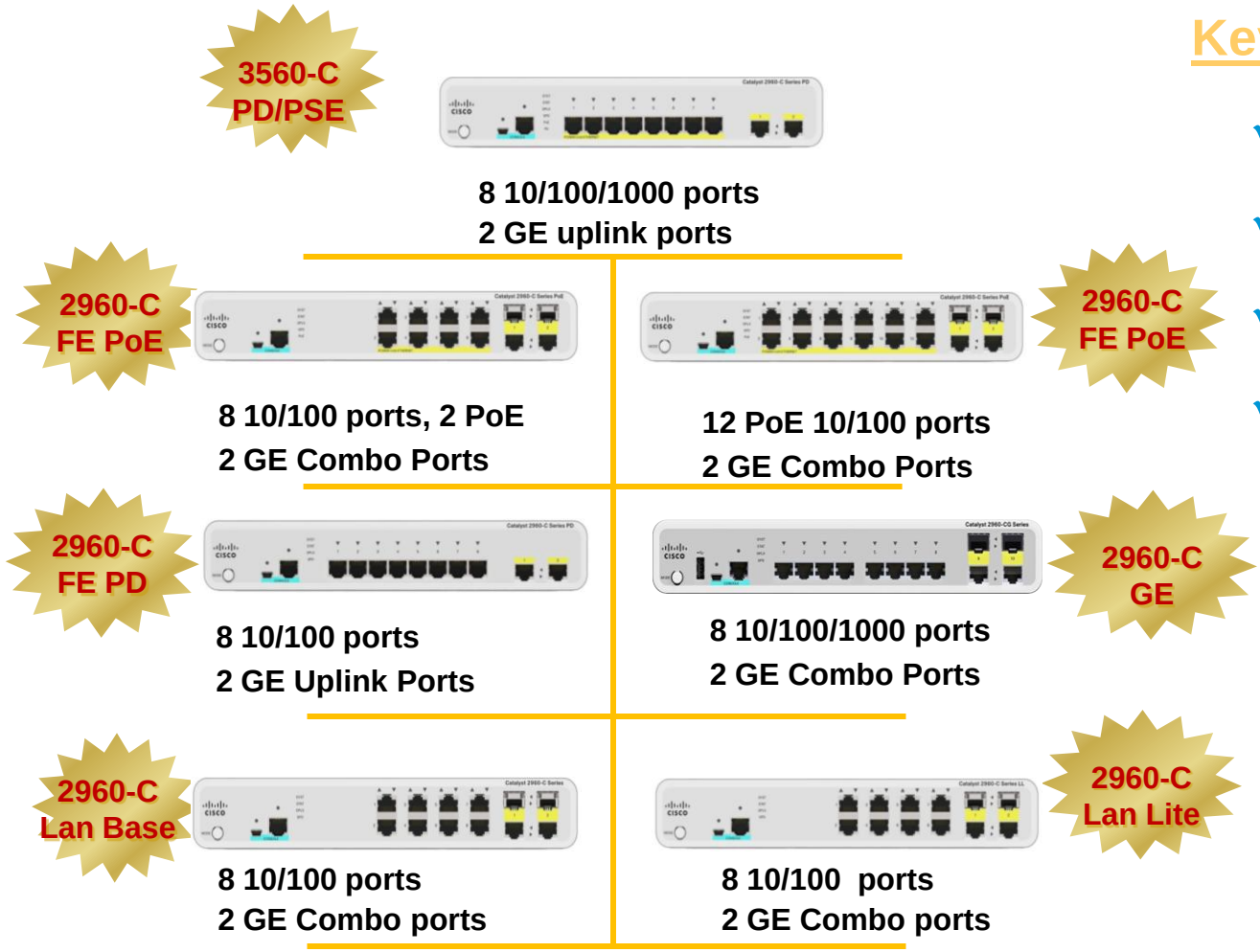
New Cisco 2960-C Compact Switches
Access Extension for Borderless Networks



Key Benefits

- ✓Zero-touch deployment
- ✓Quick troubleshooting
- ✓Reduced wiring
- ✓Ready for the Enterprise

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POE Budget for PassThrough

Switch Model	Powering Options	Available PoE Power (W)
WS-C2960CPD-8PT-L	1 PoE Uplink	0W
	2 PoE Uplinks	7W
	1 PoE+ Uplinks	7W
	1 PoE+ and 1 PoE Uplinks	15.4W
	2 PoE+ Uplinks	22.4W
	Auxiliary Input	22.4W
WS-C3560CPD-8PT-S	1 PoE+	0W
	2 PoE+	15.4W
	Auxiliary Input	15.4W

- Number of PoE Class Devices also depends on CDP Max Power information

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Campus Access Extension

Reduce Wiring Constraints and Enable Network Consolidation

LAN Infrastructure

LAN Infrastructure

Catalyst 4500E

Traditional Access

Enhanced Access

LAN Edge

With PoE

LAN Edge

UPOE

Compact switch

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Industrial Ethernet

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Current IE Product Offerings

IE 3000

- DIN rail mount
- Modular design
- Configurable 4 to 24 FE downlink ports
- 2 GE uplink ports (SFP combo)
- L2 LAN Base, L3 IP Service IOS
- Output alarms

IE 3010

- 19” rack mount, 1RU
- Fixed 24 FE downlink ports, 2 GE uplink ports (24 copper or 16 SFP + 8 PoE)
- L2 LAN Base IOS at FCS
- Input / Output alarms
- Front / back LED panels

Ruggedization	*Fanless, -40~75C , EMC/Shock/Vibration*
Compliances	*KEMA, NEMA TS-2, Marine, Rail, HazLoc…*
Industrial Protocols	*CIP, Profinet*
Resiliency and Synchronization	*REP, IEEE 1588 PTP*
Security	*Layer 2 and Layer 3 Security*
Manageability:	*SwapDrive, Industrial Smart Ports*

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Cisco Industrial Automation Products

Industrial Ethernet & Wireless

IE 3000
L2/L3 , Modular
IEEE1588, REP

IE 3010
L2 , Fixed
19” 1RU, SFP, PoE

IE3000 new SFP & POE modules

Mid-CY2012

Cisco IE 2000
Layer 2 Fixed
IEEE1588, NAT, REP

NEW

Mid-CY2012

Catalyst 2955
L2, Fixed

Shipping

Roadmap

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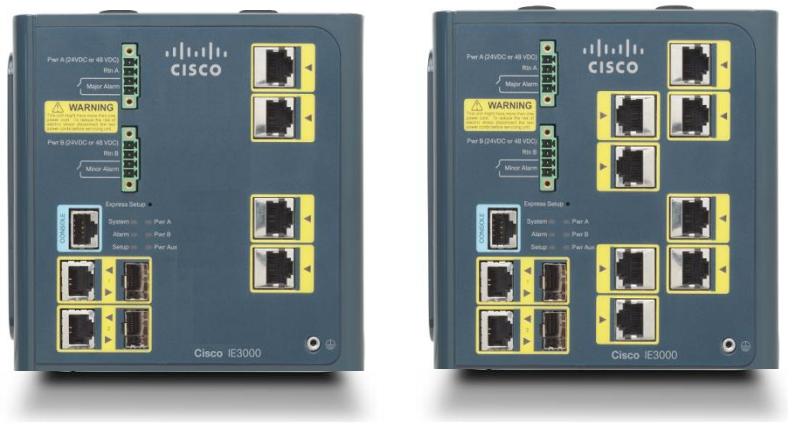
IE 3000 Modular Switch

- **4 & 8-port base switch (10/100BaseT)**
  - Dual purpose uplinks
    - 10/100/1000BaseT or SFP
  - Dimensions
    - 6.0” w x 5.8” h x 4.4” d
- **8-port copper module (10/100BaseT)**
- **8-port fiber module (100FX)**
  - Expansion options:
    - One or two 8-port 10/100BaseT modules
    - One 8-port 100FX module
    - One 8-port 10/100BaseT module and one 8-port 100FX module
  - Dimensions
    - 3.5” w x 5.8 h x 4.4” d
- **Snap on power transformer module**
  - Power module inputs:
    - 85-265 VAC
    - 88-300 VDC
  - Dimensions:
    - 2” w x 5.8” h 4.4” d



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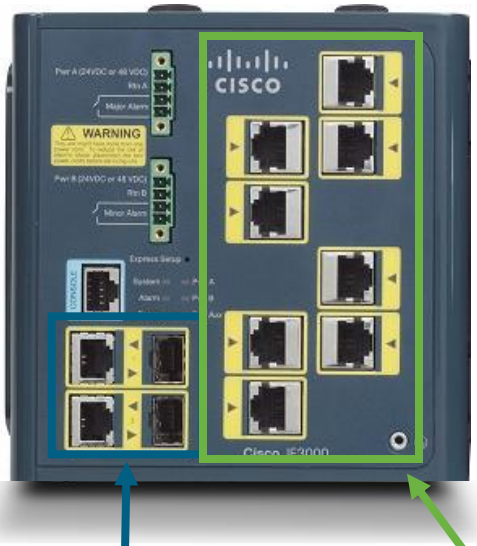
IE 3000 Modular Design

Modular Design

Base Module
(4-port or 8-port)



Extension Module A
(8-port Copper)

8 Extended Data Ports
10/100 Copper

Extension Module B (8-port Fiber)

8 Extended Data Ports
100 Fixed Fiber

Dual Purpose Uplink Ports
10/100/1000 Copper or SFP

Data Ports
10/100 Copper

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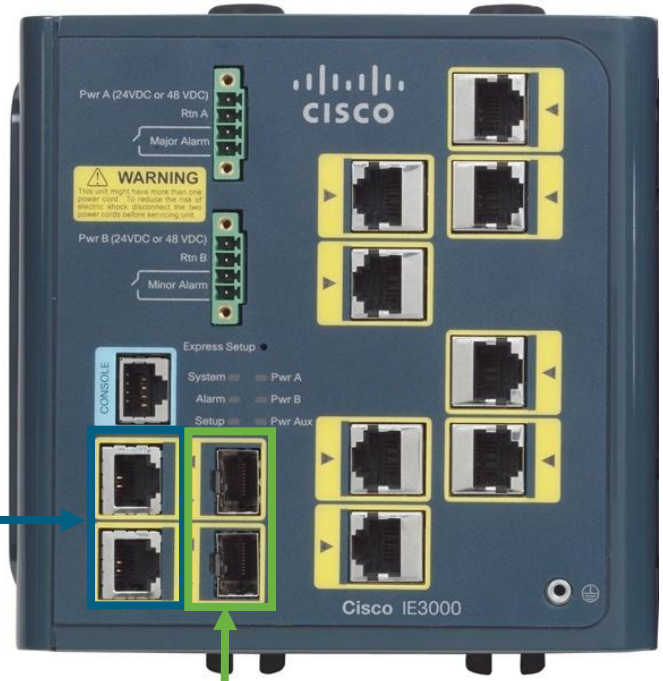
Dual Purpose Uplinks



GigE Copper Uplinks
10/100/1000

OR

SFP Fiber Uplinks
10/100/1000

- Industrial SFPs Supported:
  - 100FX
  - 1000SX
  - 100LX
  - 1000LX
  - 1000EX
  - 1000ZX

SFP Fiber Transceiver

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IE 2000

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Product Overview
IE2000 Series

External Launch : 4/23
FCS : End of June

IE2K - 4+2 Ports

4 10/100 ports, 2 RJ45 and SFP Uplink
Size: 5.1” H x 2.95” W x 4.51” D

IE2K - 8+2 Ports

8 10/100 ports, 2 Combo (SFP/Copper) Size:
5.1” H x 3.6” W x 4.51” D (or 5.26” D (-E & -N))

IE2K- 16 Ports + 4 Ports

16 10/100 ports, 4 Combo (SFP/Copper)
Uplinks, NTE: 5.1” H x 5” W x 5.26” D

Key Highlights

- 4, 8 and 16 Port Fixed configurations, Compact form factor
- SFP Uplinks to minimize configurations while providing flexible fiber options
- Feature Variations – Support for Motion applications (IEEE 1588 PTP), IP addressing and Integration (NAT), Gig uplinks and Conformal coating in select configurations , IA Lite and Base IOS software packages
- Industrial Environmentals and Certifications
- Integrated power supply, Alarm relay, IE Swap Drive (Removable SD) for easy switch replacement

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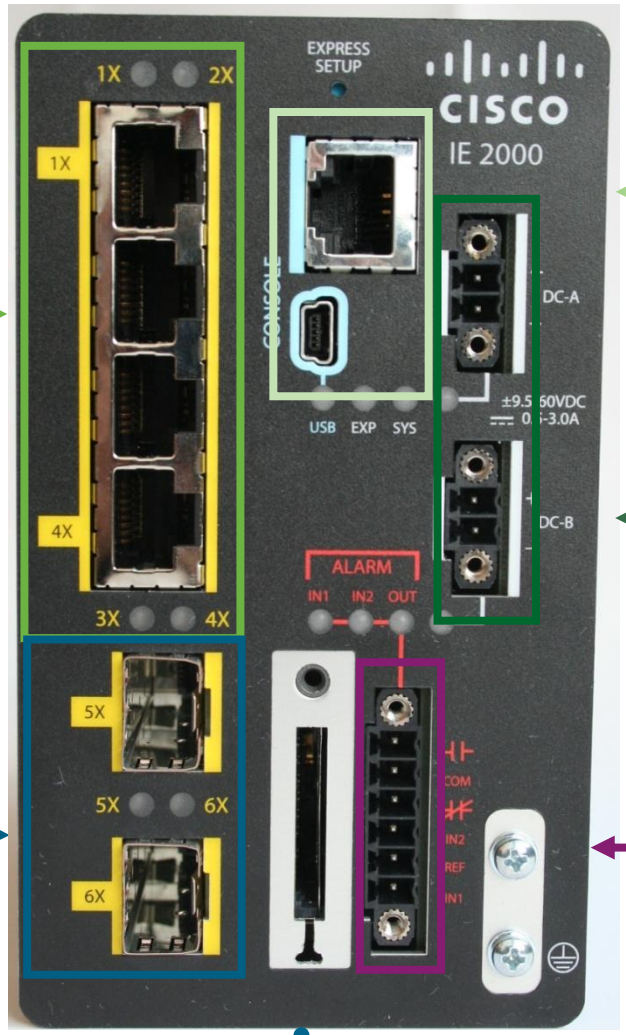
IE-2000-4T, IE-2000-4TS



4 Downlink Ports
10/100 RJ45

Console Port
RJ45 & Mini USB

Dual DC Inputs

2 Uplink Ports
FE or GE; SFP or RJ45

4 inputs 2 outputs
Dry-contact Alarm Relay

SD Flash

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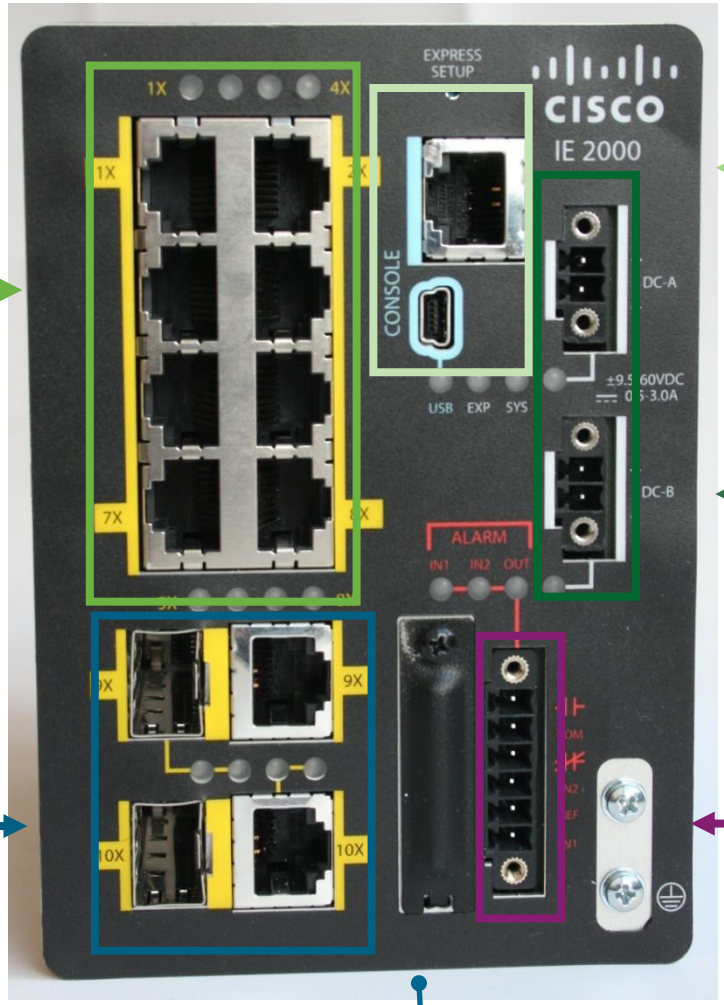
IE-2000-8TC



8 Downlink Ports
10/100 Copper

Console Port
RJ45 & Mini USB

Dual DC Inputs

2 Combo Uplink Ports
10/100/1000 SFP & RJ45

4 inputs 2 outputs
Dry-contact Alarm Relay

SD Flash

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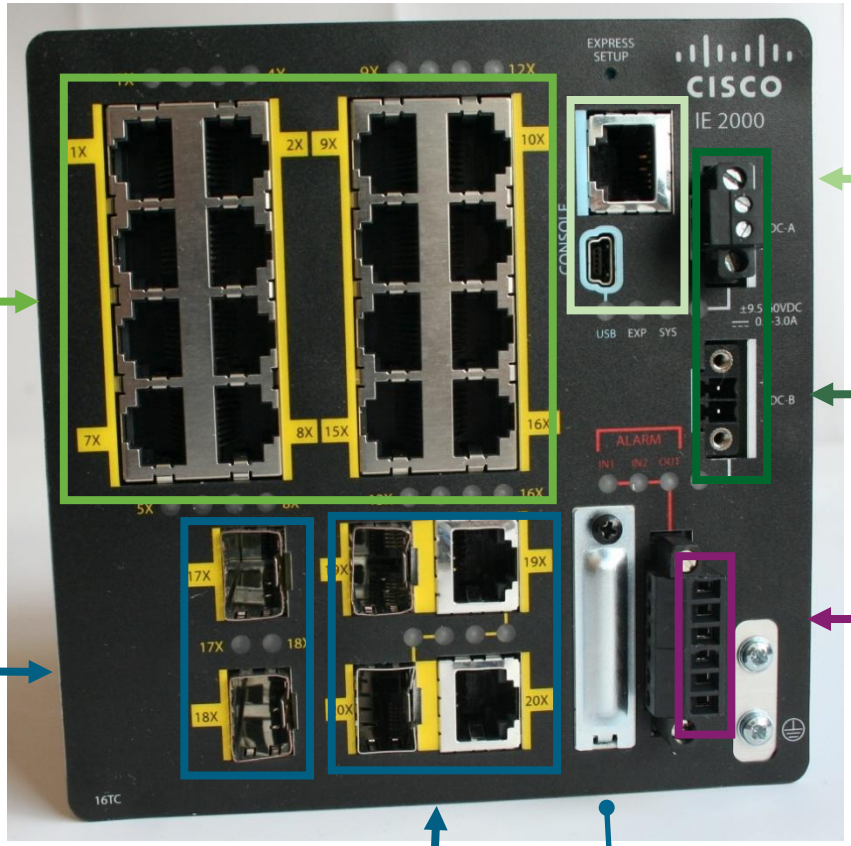
IE-2000-16TC



16 Downlink Ports
10/100 Copper

Console Port
RJ45 & Mini USB

Dual DC Inputs

4 inputs 2 outputs
Dry-contact Alarm Relay

2 Fiber Uplink Ports
10/100 SFP

SD Flash

2 Dual Media Uplink Ports
10/100/1000 SFP

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IE 3010

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Cisco IE-3010
IE-3010-24TC Front Panel

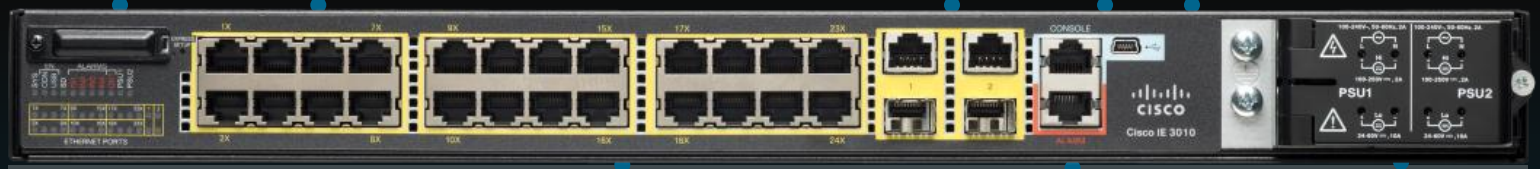
Hardened Design
- Industrial Compliant IEC61850-3 and IEEE1613

Swap Drive
- SD Flash

GE Ports
- Dual combo 10/100/1000 Copper
- 100/1000 SFP ports
- Rugged SFP support

Console
- Type B USB Console
- RS232 Console

Conductive Cooling
- No fans and moving parts
- Extended operating temp



Fast Ethernet Ports
- 10/100 Fixed Copper

Front or Rear Mount Capability
- Redundant LED placements at front and rear of router
- System, Alarm and Port Status LEDs

Field Replaceable Power Supplies
- High Voltage PS: 100 – 240VAC 100-250VDC
- Low Voltage PS: 24-60VDC

Alarm Contacts
- Four Alarm Inputs
- One Alarm Output

Cisco IE-3010
IE-3010-16S-8PC Front Panel

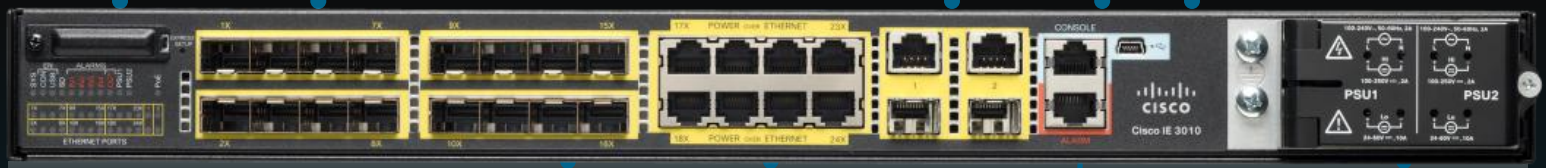
Hardened Design
- Industrial Compliant IEC61850-3 and IEEE1613

Swap Drive
- SD Flash

GE Ports
- Dual combo 10/100/1000 Copper
- 100/1000 SFP ports
- Rugged SFP support

Console
- Type B USB Console
- RS232 Console

Conductive Cooling
- No fans and moving parts
- Extended Operating Temp**



16 Fast Ethernet Ports
- 100M SFP Fiber

Front or Rear Mount Capability
- Redundant LED placements at front and rear of router
- System, Alarm and Port Status LEDs

8 Fast Ethernet Ports
- 10 /100M Fixed Copper POE

Field Replaceable Power Supplies
- High Voltage PS: 100 – 240 VAC 100 – 250 VDC
- Low Voltage PS: 24 – 60 VDC

Alarm Contacts
- FOUR Alarm Inputs
- ONE Alarm Output

Cisco IE-3010
Hardware Details

Rear View

IE-3010 has LED display on both front and rear - allowing for front or reverse rack mounting

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Cisco IE-3010
Software Overview

IE-3010 FCS software Release: 12.2(53)EZ

- FCS release based on IOS 12.2(53)SE features and IE3010 specific enhancements.
- IE-3010 currently supports one image:

  Layer 2 LAN Base IOS
- Layer 3 IP Service image is planned for CY2012

IE-3010 Future Software Releases:

- IEEE 1588 PTP
- IA Management (CIP, Profinet)
- Device Manager, Cisco Network Assistant and Cisco Works

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Cisco 2500 Series Connected Grid Switches

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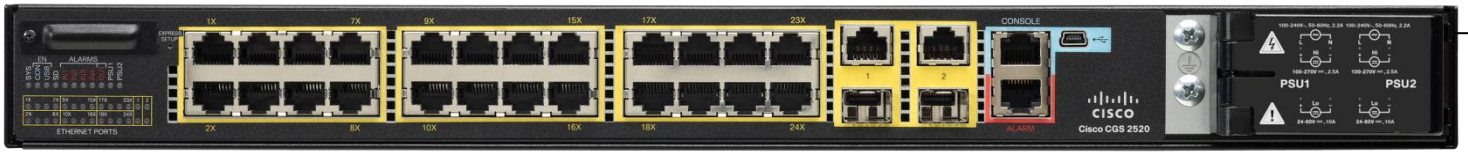
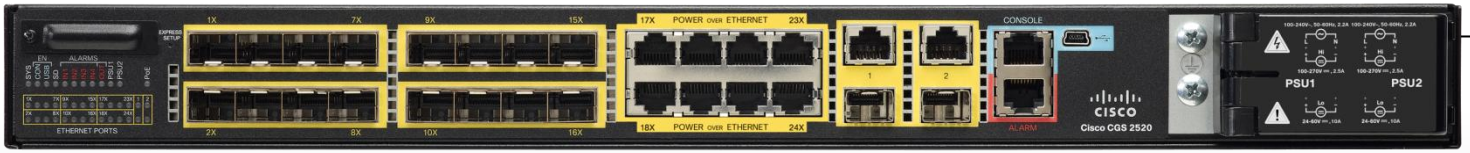
Substation Automation / Integration
Cisco CGS 2500 Series



CGS-2520-24TC

24 10/100 ports
2 dual-port GE uplinks



CGS-2520-16S-8PC

16 FE SFP ports
8 10/100/PoE ports
2 dual-port GE uplinks

Based on the Cisco Catalyst 2K / 3K series, the most successful Enterprise Switches in the world today!

Enhanced for Utility deployments

- Substation Compliant (IEC 61850-3, IEEE 1613)
- No Moving Parts
- Dual Redundant, Field Replaceable Power Supplies
- Extended Temperature Range Support
- Extended Power Supply Support
- Choice of Front or Reverse Cabling
- CG Swap Drive Functionality
- High availability platform: REP, Flexlink
- GOOSE support: QoS, Fast Ring Convergence and VLAN handling
- MODBUS Memory Map support
- Utility Specific Smartport macros.
- Hardware Based Security solution: SUDI
- Advanced Security solution
- Option to upgrade to Layer 3 feature sets

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Cisco CGS 2500 Series
Enhanced Utility Hardware Design

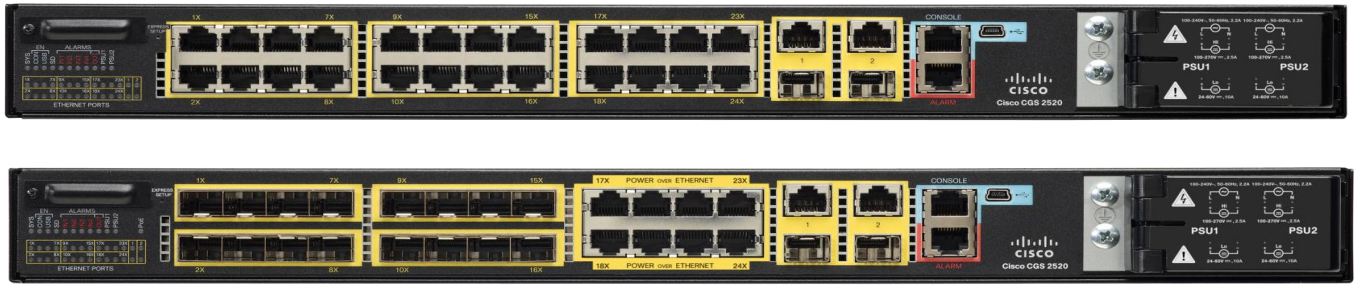
- **Utility Grade Hardware Reliability**
  - Designed to fully comply with IEC 61850-3 and IEEE 1613
  - Redundant, Field Replaceable and Hot-Swappable power supplies
  - High observed MTBF
  - World Class post sales support- Cisco TAC

- **Utility Specific Hardware Design**
  - 19” rack mount design and 1 RU form factor for relay rack installations.
  - Wide range of power supplies options: AC, high DC, and low DC
  - Front / Reverse cabling
  - Enhanced power cage design provides ground path and EMI shield
  - Custom over mold terminal block meets safety creepage requirements
  - “0% Packet Loss” under EMI stress*

- **Deployment Flexibility and Investment protection**
  - Layer 2 and Layer 3 functionality in a single platform
  - POE support for IP Phones and Physical security deployments
  - CG Swap Drive functionality for quick and easy deployments
  - HW ready for IEEE 1588v2
  - HW ready for ISSU

*** On fiber ports and Shielded twisted pair**

Cisco CGS 2500 Series
Hardware Overview



- **Availability: Orderable and Shipping**
- **Port Configurations:**
  - 24-10/100BaseT ports and two dual-purpose gigabit-Ethernet uplinks
  - 16 Fast Ethernet (FE) SFP ports, Eight 10/100 Base-TX/PoE ports, and two dual-purpose gigabit-Ethernet uplinks.
- **Power Supply Options:**
  - PWR-RGD-LOW-DC: Low DC (24/48V) module
  - PWR-RGD-AC-DC: AC/ High DC (88-300VDC/85-264VAC) module
- **Software Requirements: 12.2(53)EX and later**

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Cisco CGS 2500 Series
CGS-2520-24TC Front Panel

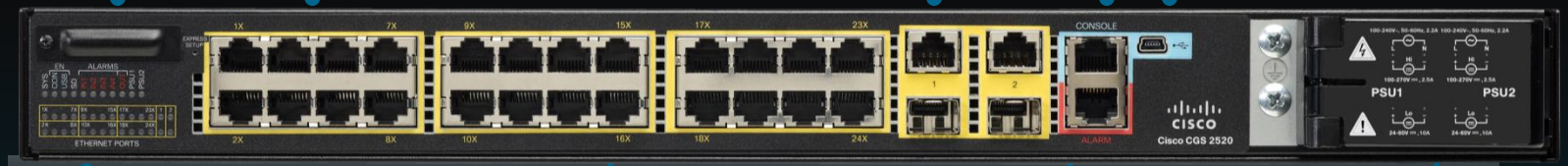
Substation Hardened
- Substation Compliant IEC61850-3 and IEEE1613

CG Swap Drive
- SD Flash

GE Ports
- Dual purpose 10/100/1000 Copper
- 100/1000 SFP ports
- Rugged SFP support

Console
- Console over USB
- Console over RS232

Conductive Cooling
- No fans and/or moving parts
- Increased Operating Temp**



Fast Ethernet Ports
- 10/100 Fixed Copper

Front or Rear Mount Capability
- Redundant LED placements at front and rear of router
- System, Alarm and Port Status LEDs

Field Replaceable Power Supplies
- High Voltage PS: 85 – 264VAC 88-300VDC
- Low Voltage PS: 24-60VDC

Alarm Contacts
- FOUR Alarm Inputs
- ONE Alarm Output

Cisco CGS 2500 Series
CGS-2520-16S-8PC Front Panel

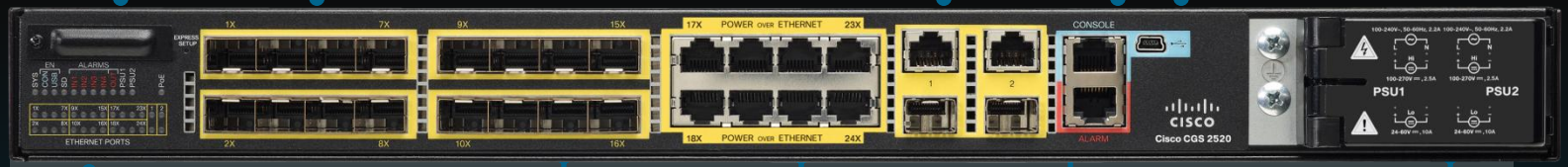
Substation Hardened
- Substation Compliant IEC61850-3 and IEEE1613

GE Ports
- Dual purpose
- 10/100/1000 Copper
- 100/1000 SFP ports
- Rugged SFP support

Console
- Console over USB
- Console over RS232

CG Swap Drive
- SD Flash

Conductive Cooling
- No fans and/or moving parts
- Increased Operating Temp**



16 Fast Ethernet Ports
- 100M SFP

Field Replaceable Power Supplies
- High Voltage PS: 85 – 264 VAC 88-300 VDC
- Low Voltage PS: 24-60 VDC

Front or Rear Mount Capability
- Redundant LED placements at front and rear of router
- System, Alarm and Port Status LEDs

8 Fast Ethernet Ports
- 10 /100M Fixed Copper PoE

Alarm Contacts
- FOUR Alarm Inputs
- ONE Alarm Output

Cisco CGS 2500 Series
Power Supply Details

Rear Panel View

PWR-RGD-LOW-DC	Low DC (24-60VDC) Power Supply
PWR-RGD-AC-DC	AC/ High DC (88-300VDC/85-264VAC) Power Supply

- Combined standard AC and high voltage DC (88-300VDC, 85-264VAC) power supply and low voltage DC (24-60VDC) power supply are available.
- Maximum flexibility – supports any combo of high voltage and low voltage power supplies.
- Load sharing power supplies in a dual power supply configuration; a single power supply is capable of supporting a fully configured switch
- Both power supplies are universally interchangeable with the CGR 2010 Router.
- Standard internal power supply provides inline power (802.3af-compliant PoE and Cisco Inline Power) to offer PoE support.

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Cisco CGS 2500 Series
Hardware Specifications

Specification	CGS-2520-24TC	CGS-2520-16S-8PC
Ethernet Ports	24 x 10/100 copper + 2 x 1G Dual Purpose	16 x 100M SFP + 8 x 10/100 copper POE + 2 x 1G Dual Purpose
Chassis H x W x D	1.75”H x 17.5”W x 14”D (4.45 x 44.5 x 35.5 cm) With Power Supplies Installed	
Weight (no power supplies)	9.1lb (4.1kg)	10lb (4.5kg)
Available Rack Mount Accessories	19”, ETSI, 23” (Post FCS)	
Wall Mount Option	Yes, Using 19” Brackets shipped with Unit	
Cabling	Both Front and Reverse cabling is supported	
AC Power Input	100-240 VAC, 2-0.75A, 50-60 Hz	
High DC Power Input	100-250 VDC (+20%/-12%), 2-0.75A	
Low DC Power Input	24-60 VDC (+/- 25%), 10-2.5A	
Dual Power Supplies	Two modular power supply FRUs (AC or DC)	
Operating Temperature*	-40 C to +85 C (type Test) -40 C to +60 C (continuous operation)	

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Cisco CGS 2520
Supported Ruggedized SFPs

Part #	Dual-Purpose GE Ports	Downlink FE Ports CGS-2520-16S-8PC	DOM Supported by SFP*	Temperature Range**
GLC-SX-MM-RGD	Yes	No	No	IND
GLC-LX-SM-RGD	Yes	No	No	IND
GLC-FE-100LX-RGD	Yes	Yes	No	IND
GLC-FE-100FX-RGD	Yes	Yes	No	IND
GLC-ZX-SM-RGD	Yes	No	No	IND

Temperature Range	CGS 2520 Operating Temperature Range Support
IND	-40°C to +60°C
EXT	-5°C to +60°C
COM	0°C to +45°C

LC Connectors

**If non-industrial (i.e., EXT, COM) SFPs are used, the CGS 2520 operating temperature must be de-rated.

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Catalyst 6500
E Series Chassis

- Enhanced (“E”) chassis offer higher power capacity, better signal integrity, and higher bandwidth to support Supervisor 2T
  - –3, 4, 6, 9 and 13-slot versions
- Classic switching bus traces/connectors
- Crossbar fabric traces/connectors
- Redundant power supplies
- Fan tray for system cooling
  - –6509-V-E chassis offers redundant fan trays and air filtration

- Redundant voltage termination (VTT)/clock modules
- Redundant MAC address EEPROMs

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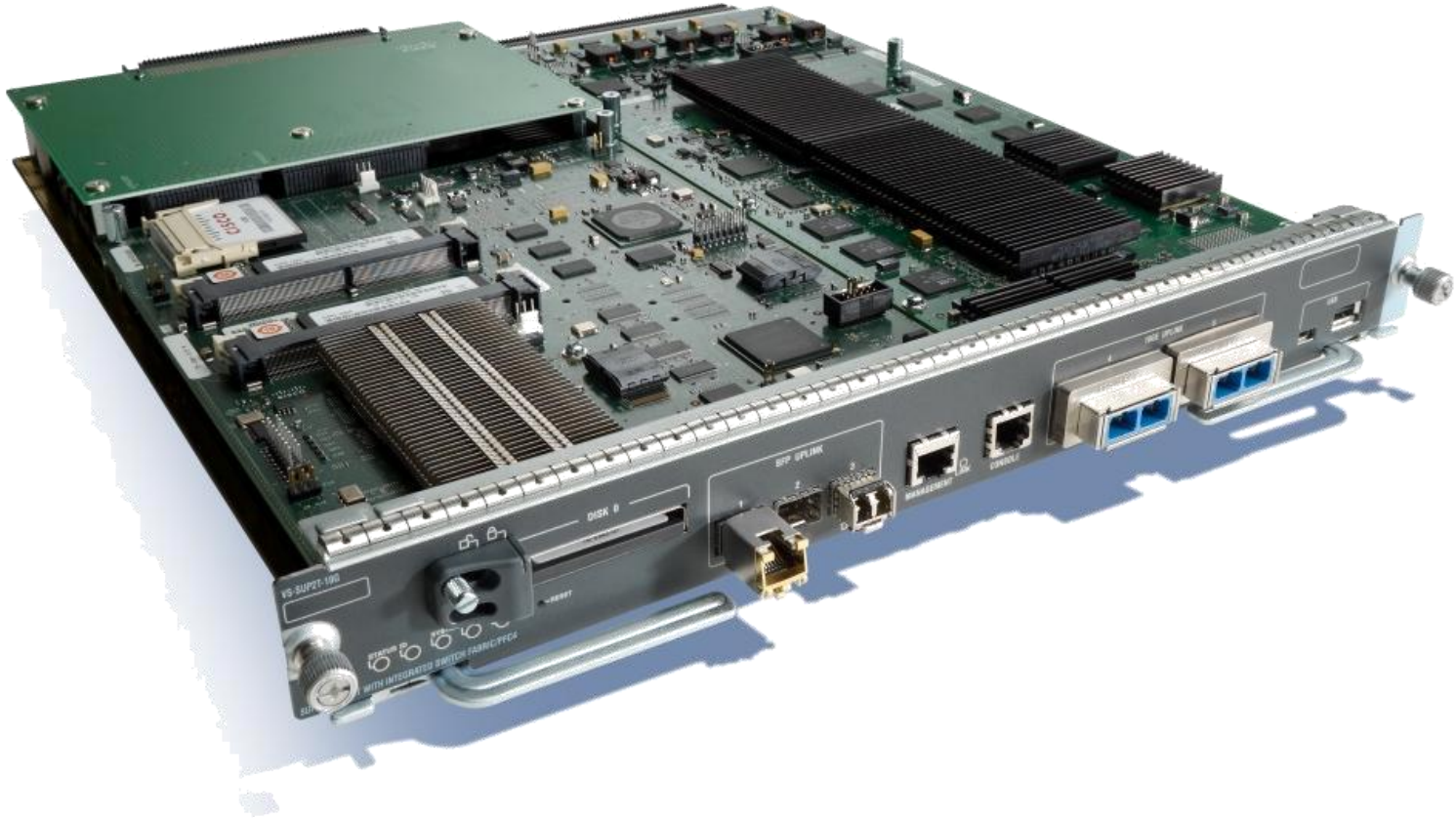
Supervisor 2T
Introduction

The Supervisor 2T is designed for deployment in the Core and Distribution Layers of the Network - it is the highest performing Supervisor option available for the Catalyst 6500 platform…



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Innovation with Investment Protection

Scaling Catalyst 6500 to 160Gbps/slot

The road to 8T….

- 160G per slot
- Enabled with existing E-series chassis & Sup2T
- Up to 536 10G ports
- Up to 132 40G ports
- Up to 44 100G ports

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Road to VSS 8T: Step 1 - 160G per slot

Requirements

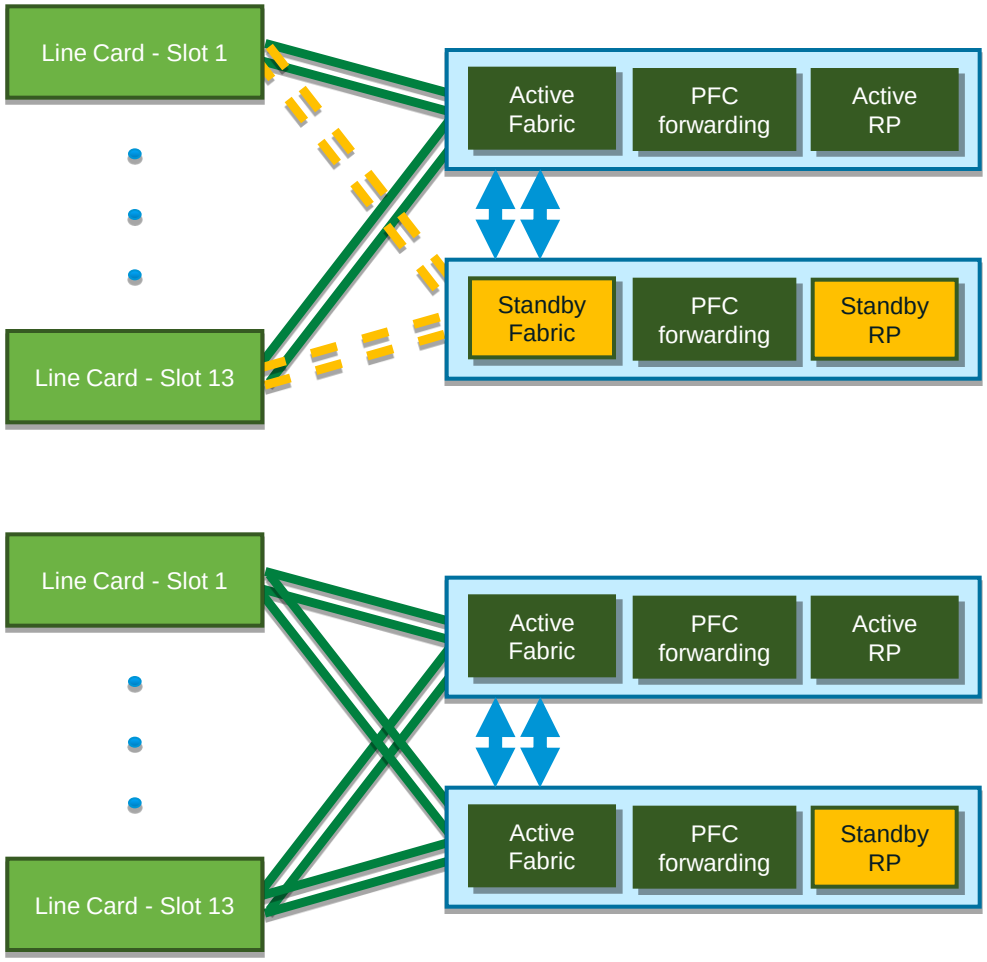
1. Increase bandwidth per slot
2. Keep backward compatibility to maximize investment protection

What's not possible?

Increase the speed of the channels. It will require new ASIC, new Sup…

What's possible?

Use both fabric as Active in a dual supervisor environment



- Second Supervisor mandatory to get 160G per slot
- This architecture is backward compatible with Sup2T
- Control Plane Redundancy

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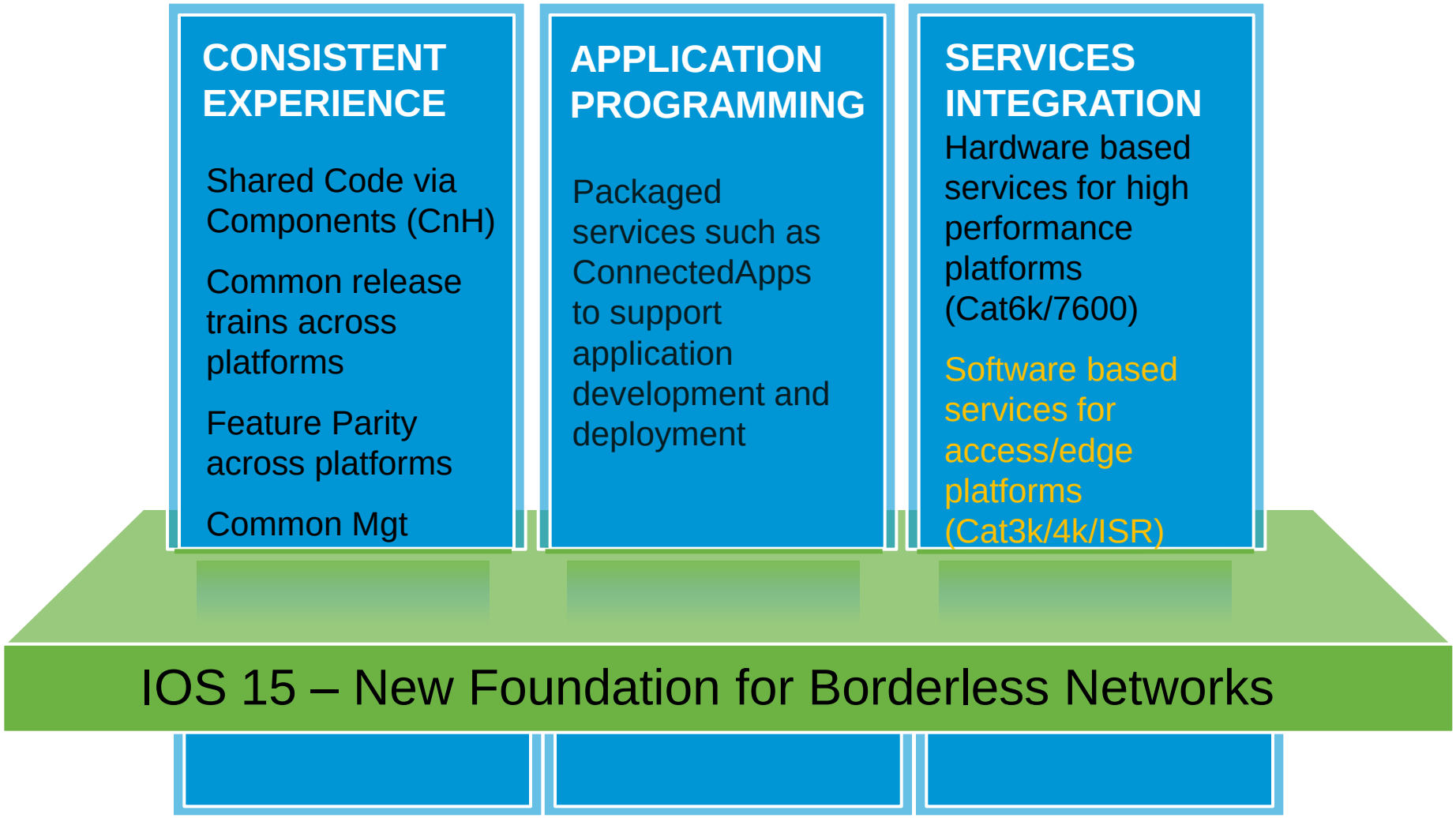
IOS Strategy for Campus



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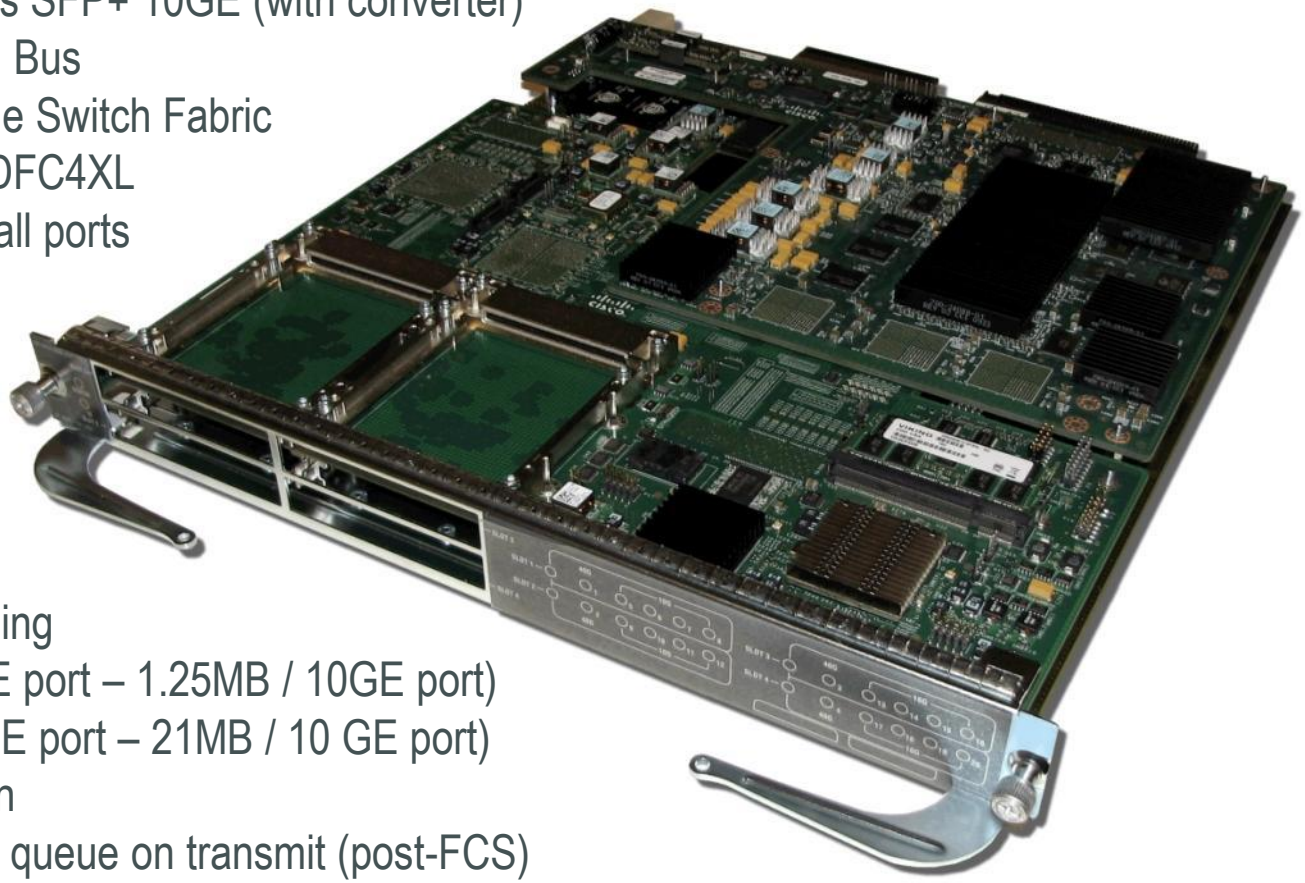
WS-X6904-40G-2T / 2TXL
Introduction

- dCEF2T Linecard
- 4 ports CFP 40GE **or** 16 ports SFP+ 10GE (with converter)
- No Connection to the Shared Bus
- 2 x 40Gb Connections into the Switch Fabric
- Supports integrated DFC4 / DFC4XL
- Supports Cisco TrustSec on all ports
- Supports VSL on all ports



- Up to 60Mpps local forwarding
- Ingress buffer (5MB / 40 GE port – 1.25MB / 10GE port)
- Egress buffer (88MB / 40 GE port – 21MB / 10 GE port)
- Egress Multicast Replication
- Supports dual Strict Priority queue on transmit (post-FCS)
- Supports 2 receive queues and 8 transmit queues per port
- Supports Deficit Weighted Round Robin and Shaped Round Robin

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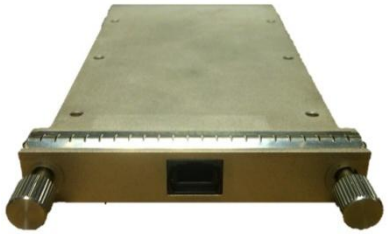
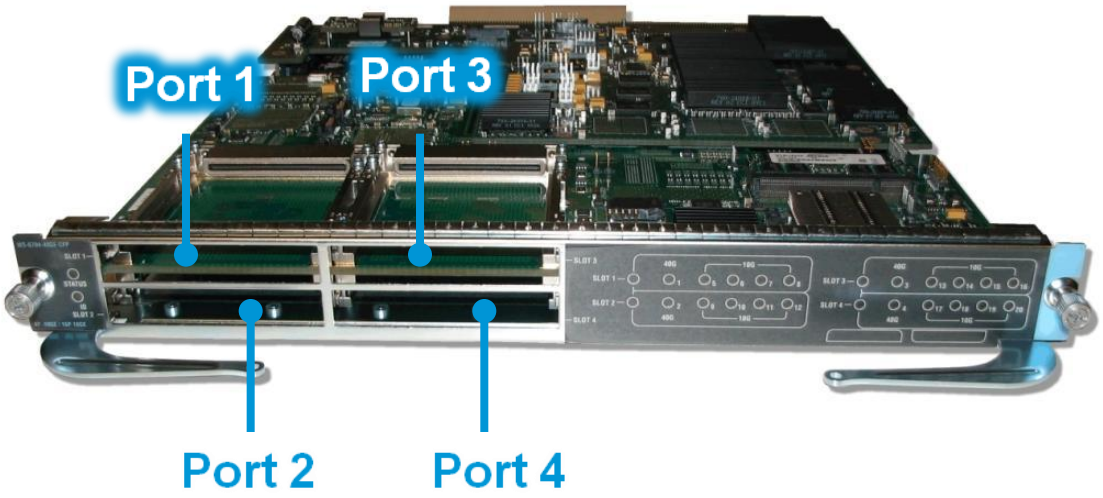
WS-X6904-40G-2T / 2TXL

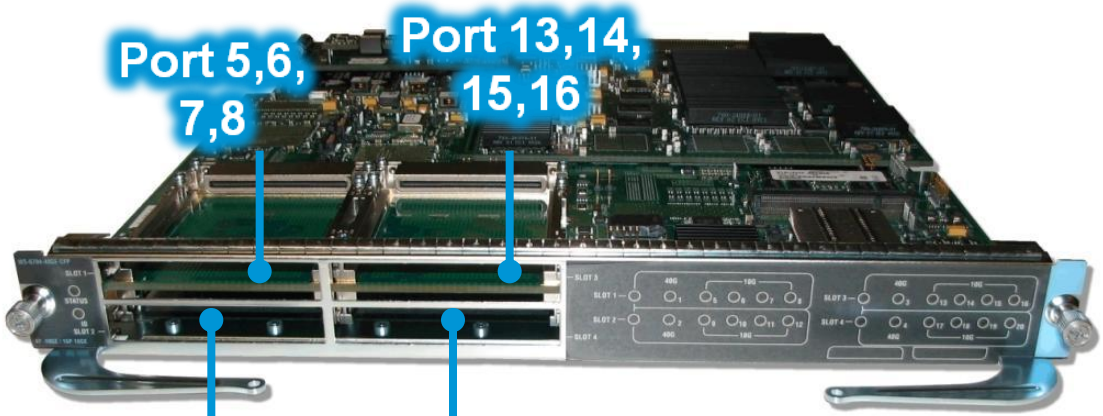
Port Numbering

Single Mode CFP



- IEEE 802.3ba Compliant





- 4 x SFP+ converter in each slot
- Cisco TrustSec in hardware
- VSL capable in 10G or 40G mode

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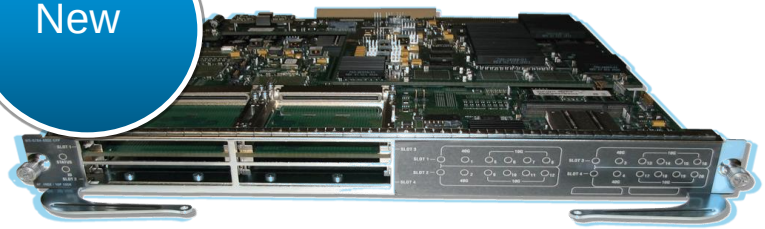
6904-40G-2T/2TXL

Proven Technology

New



CVR-CFP-4SFP10G FourX Adapter

CFP-40G-SR4

CFP-40G-LR4

UNIVERSITY OF TWENTE.

SIG SUSQUEHANNA

BT

T · · Systems

VERISIGN

EFT & Beta Customers

- **2010:** Showcased industry's first modular 40GE with Catalyst 6500 at the Nov. 2010 SC10 show with Ethernet Alliance

SC10 New Orleans, LA

ethernet alliance

IXIA

SPIRENT Communications

THE UNIVERSITY OF MICHIGAN 1817

Caltech

SC11 Seattle, WA | Connecting communities through HPC

- **Now:** Showcased 40GE with Catalyst 6500 at the Nov. 2011 SC11 show with Caltech and University of Michigan in an end-to-end transferring massive particle physics data

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WS-X6904-40G-2T / 2TXL

Supported Optics

Product ID	Transceiver Type	Media Type	Distance
CFP-40G-SR4	40GBASE-SR4 (MMF)	Multi-mode Fiber 850nm	100m over OM3 multi-mode fiber
CFP-40G-LR4	40GBASE-LR4 (SMF)	Single Mode Fiber 1310nm CWDM	10km
CVR-CFP-410GSFP	FourX Adapter: Converts each 40GE CFP port to 4 10GE SFP+ ports	N/A	N/A
SFP-10G-SR	Supported SFP+ transceivers with FourX adapter	MMF (OM3)	Up to 300m
SFP-10G-LR		SMF (G.652)	10km
SFP-10G-LRM		MMF (FDDI grade)	220m
SFP-10G-ER		SMF(G.652)	40km
SFP-H10GB-CU1M		Copper TwinAx cable	1m
SFP-H10GB-CU3M		Copper TwinAx cable	3m
SFP-H10GB-CU5M		Copper TwinAx cable	5m

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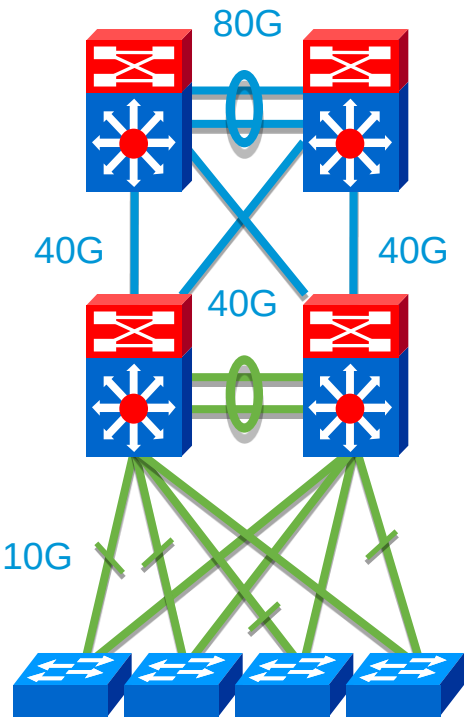
WS-X6904-40G-2T / 2TXL

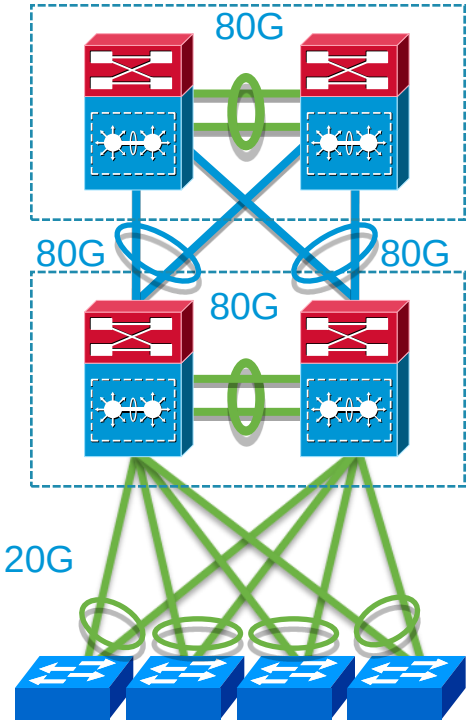
Use Cases

Traditional Campus



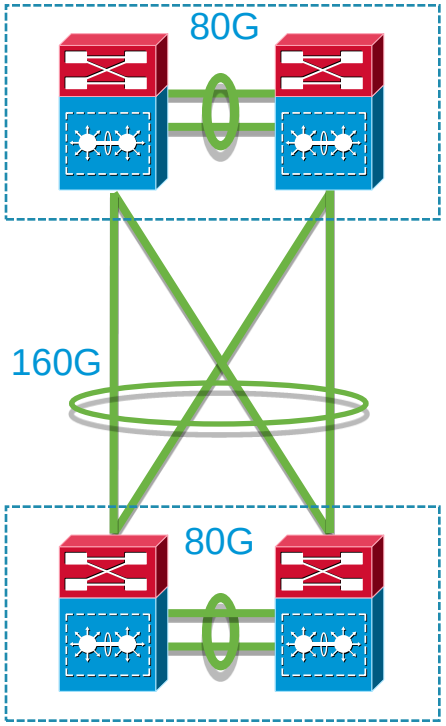
Transition to 10G / 40G
- 10G Access to Dist
- 80G+ Dist to Core ECMP
- 80G+ EC Core Connects

Virtualized Campus



Transition to 10G / 40G
- 20G+ MEC Access to Dist
- 80G+ MEC Dist to Core
- 80G+ VSL in VSS

Data Center Connect



Transition to 40G
- 160G Dark Fiber DCI
- 80G+ VSL in VSS

GREEN links are L2; **BLUE** links are L3

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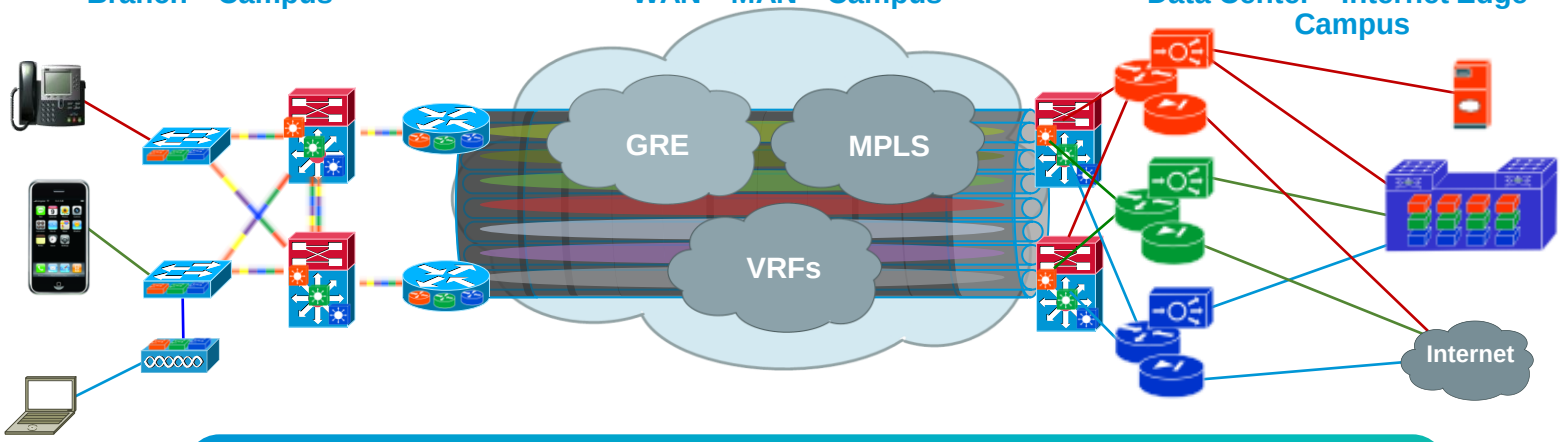
Easy Virtual Networks (EVN) Supervisor 2T

IOS 15.0(1)SY1

ACCESS CONTROL	PATH ISOLATION	SERVICES EDGE
Branch—Campus	WAN—MAN—Campus	Data Center—Internet Edge—Campus



Easy Virtual Networks (EVN)

- Enterprise Scalability
- Simplified configuration and management
- Works with existing campus routing protocols
- Routing Contexts for ease of operations in a VRF
- Better Monitoring and Troubleshooting
- Shared Services between groups

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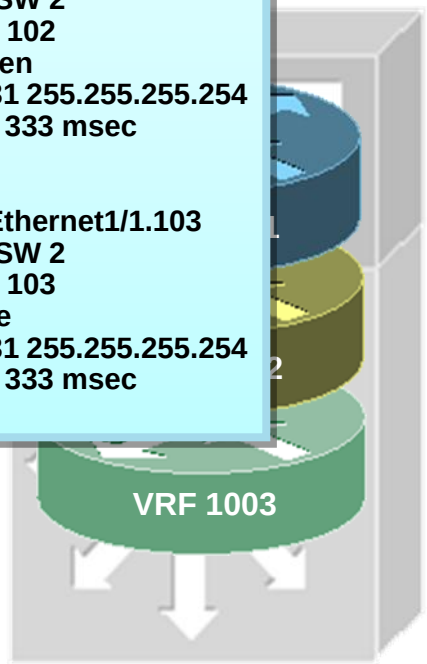
VRF-Lite Hop-by-Hop Configuration Example

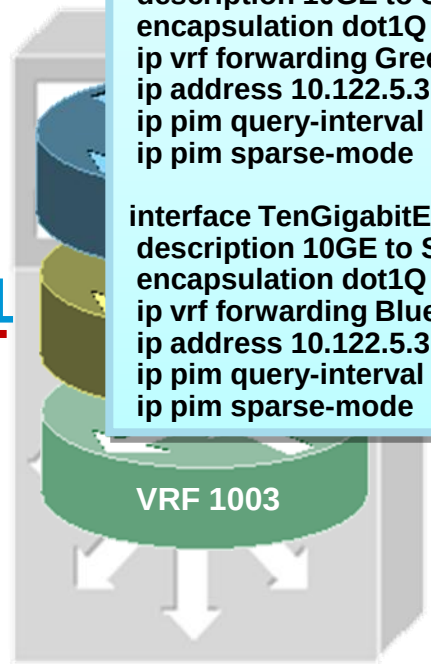
```
interface TenGigabitEthernet1/1.101
 description 10GE to SW 2
 encapsulation dot1Q 101
 ip vrf forwarding Red
 ip address 10.122.5.31 255.255.255.254
 ip pim query-interval 333 msec
 ip pim sparse-mode

interface TenGigabitEthernet1/1.102
 description 10GE to SW 2
 encapsulation dot1Q 102
 ip vrf forwarding Green
 ip address 10.122.5.31 255.255.255.254
 ip pim query-interval 333 msec
 ip pim sparse-mode

interface TenGigabitEthernet1/1.103
 description 10GE to SW 2
 encapsulation dot1Q 103
 ip vrf forwarding Blue
 ip address 10.122.5.31 255.255.255.254
 ip pim query-interval 333 msec
 ip pim sparse-mode
```



T1/1 T1/1




```
interface TenGigabitEthernet1/1.101
 description 10GE to SW1
 encapsulation dot1Q 101
 ip vrf forwarding Red
 ip address 10.122.5.31 255.255.255.254
 ip pim query-interval 333 msec
 ip pim sparse-mode

interface TenGigabitEthernet1/1.102
 description 10GE to SW1
 encapsulation dot1Q 102
 ip vrf forwarding Green
 ip address 10.122.5.31 255.255.255.254
 ip pim query-interval 333 msec
 ip pim sparse-mode

interface TenGigabitEthernet1/1.103
 description 10GE to SW1
 encapsulation dot1Q 103
 ip vrf forwarding Blue
 ip address 10.122.5.31 255.255.255.254
 ip pim query-interval 333 msec
 ip pim sparse-mode
```

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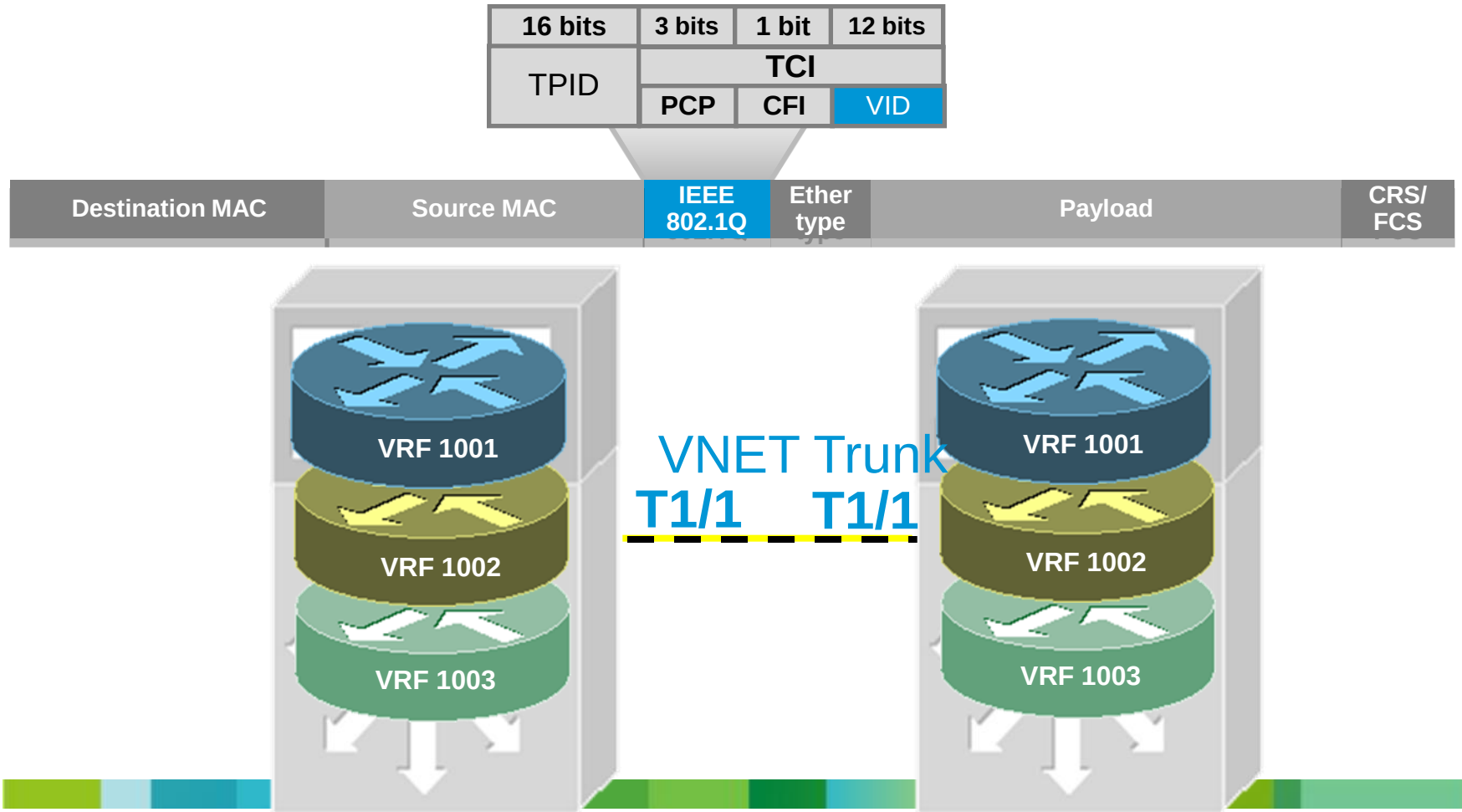
Easy Virtual Networks

VNET trunk ports “repurpose” the IEEE 802.1Q VLAN ID field to indicate the VRF ID



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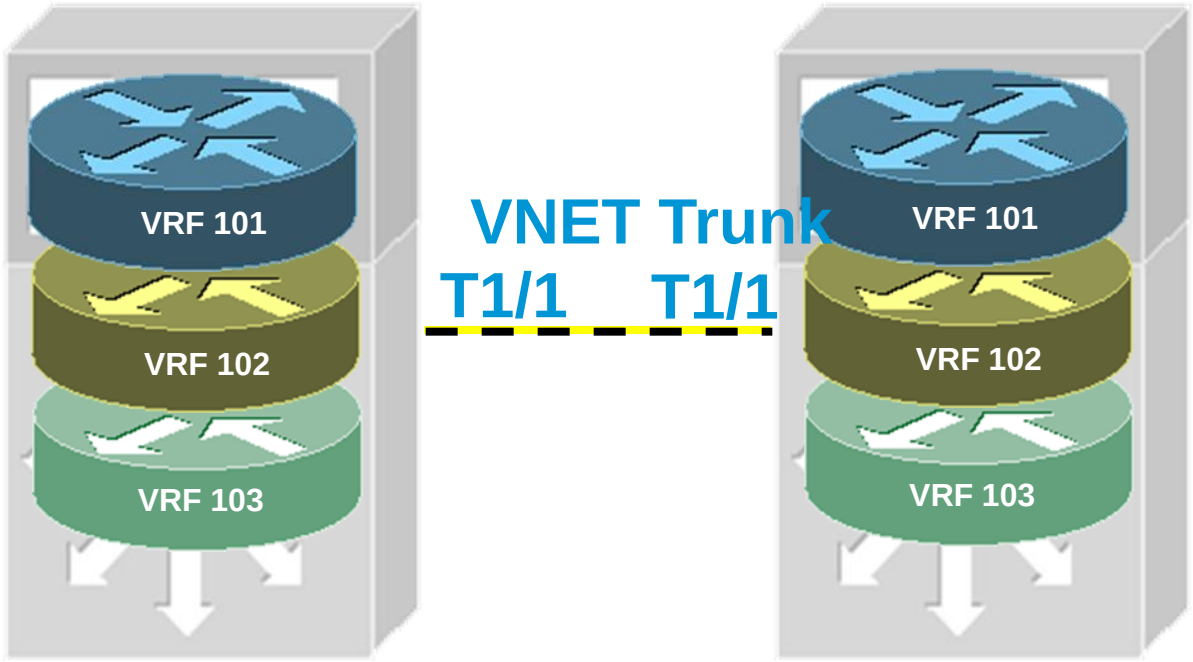
VNET Trunk Configuration Example

```
vrf definition blue
 vnet tag 101

interface TenGigabitEthernet1/1
 description 10GE to SW 2
 vnet trunk
 ip address 10.122.5.31 255.255.255.254
 ip pim query-interval 333 msec
 ip pim sparse-mode
```

```
vrf definition blue
 vnet tag 101

interface TenGigabitEthernet1/1
 description 10GE to SW 1
 vnet trunk
 ip address 10.122.5.32 255.255.255.254
 ip pim query-interval 333 msec
 ip pim sparse-mode
```



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Service modules

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Service Module Support

Module	Supervisor 720	Supervisor 720-10G	Supervisor 2T
ACE10	12.2(33)SXF4	12.2(33)SXH (Standalone) 12.2(33)SXI (VSS)	Not Supported
ACE20	12.2(33)SXF4	12.2(33)SXH (Standalone) 12.2(33)SXI (VSS)	12.2(50)SY
ACE30	12.2(33)SXI4	12.2(33)SXI4	15.0(1)SY
ASA-SM	12.2(33)SXJ1	12.2(33)SXJ1	15.0(1)SY1
FWSM	12.2(14)SX1	12.2(33)SXH (Standalone) 12.2(33)SXI (VSS)	12.2(50)SY
IDSM-2	12.2(14)SX1	12.2(33)SXH (Standalone) 12.2(33)SXI (VSS)	Not Supported
NAM-1 / NAM-2	12.2(14)SX1	12.2(33)SXH	12.2(50)SY
NAM-3	12.2(33)SXJ1	12.2(33)SXJ1	15.0(1)SY1
WiSM	12.2(18)SXF2	12.2(33)SXH (Standalone) 12.2(33)SXI (VSS)	12.2(50)SY
WiSM-2	12.2(33)SXJ	12.2(33)SXJ	15.0(1)SY

See notes for more details.

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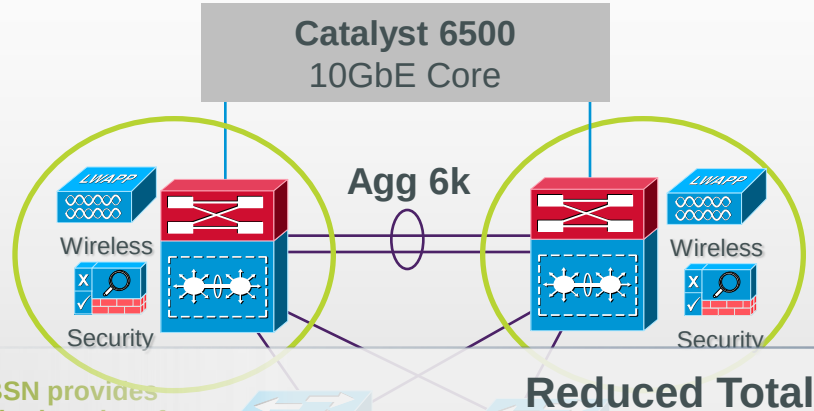
Architecture Blueprint for Integrated Services

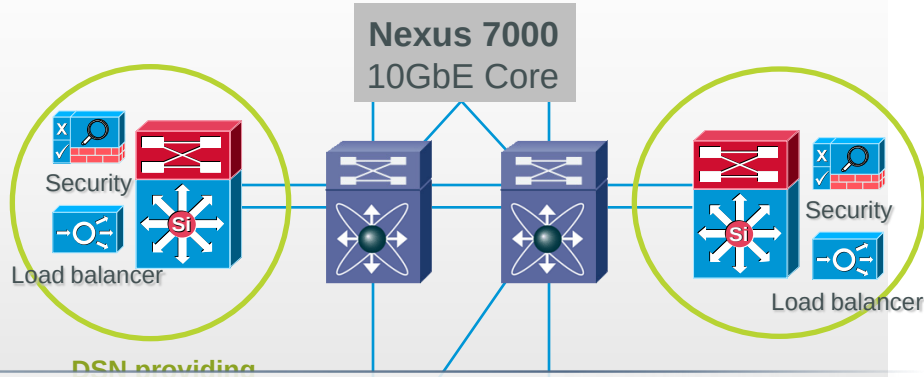
6500 as Borderless Services Node (BSN)

Provides Service Virtualization, Wired / Wireless Integration and Secure Access



6500 as Data Center Services Node (DSN)

Virtualized infrastructure with service tiers to deliver multiple types of SLAs / offerings



Reduced Total Cost of Ownership

- Modular Design, Service Virtualization, Reduced power, space, cooling requirements

Simplified Operations

Single point of management and policy enforcement

Anuncios EoS – Cat 6500

Sup 32 → Reemplazo Sup 2T/Sup720-10G
EoS Date: 31 Marzo 2012

http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps708/eol_c51-683155.html

Sup 720-3B/3BXL → Reemplazo Sup 2T/Sup720-10G
EoS Date: 31 Marzo 2013

http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps708/eol_c51-697975.html

Selected Line Cards 61xx, 63xx, 65xx→ Revisar anuncio por sugerencia
EoS Date: 31 Julio 2012

http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps708/eol_c51-698807.html

Chasis 6513 → Reemplazo Chasis 6513-E
EoS Date: 4 Agosto 2012

http://www.cisco.com/en/US/prod/collateral/switches/ps5718/ps708/eol__C51-699410.html

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Summary

INNOVATION

2T Innovations address key Enterprise trends enabling customers to build the Next Gen Campus with **Investment protection**

UNIFIED SERVICES

2T portfolio leads the way in delivering IOS & integrated services for Borderless and Data Center deployments

CATALYST 6500 E-SERIES

TRANSITION

2T optimizes performance while maximizing services for Campus providing transition paths to 10G/40G and 100GE readiness

LOWER TCO

2T price and operational improvements such as Satellite/Smart Install offer lower TCO with a roadmap to take the platform beyond 2020

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Thank you.

TCO: WireShark

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TCO: WireShark

- Why? What problem does it solve
  - On the Spot packet analysis
  - Eliminates need for RSPAN
  - Eliminates need to travel to wiring closet and connect laptop.
  - Context Relevant packet Capture
  - Example: troubleshoot active dot1x auth problem
    - capture packets between PC and switch in both directions as the issue happens.
- Wait there's more
  - Combined with EEM for event based capture
    - Demo's really well!!!

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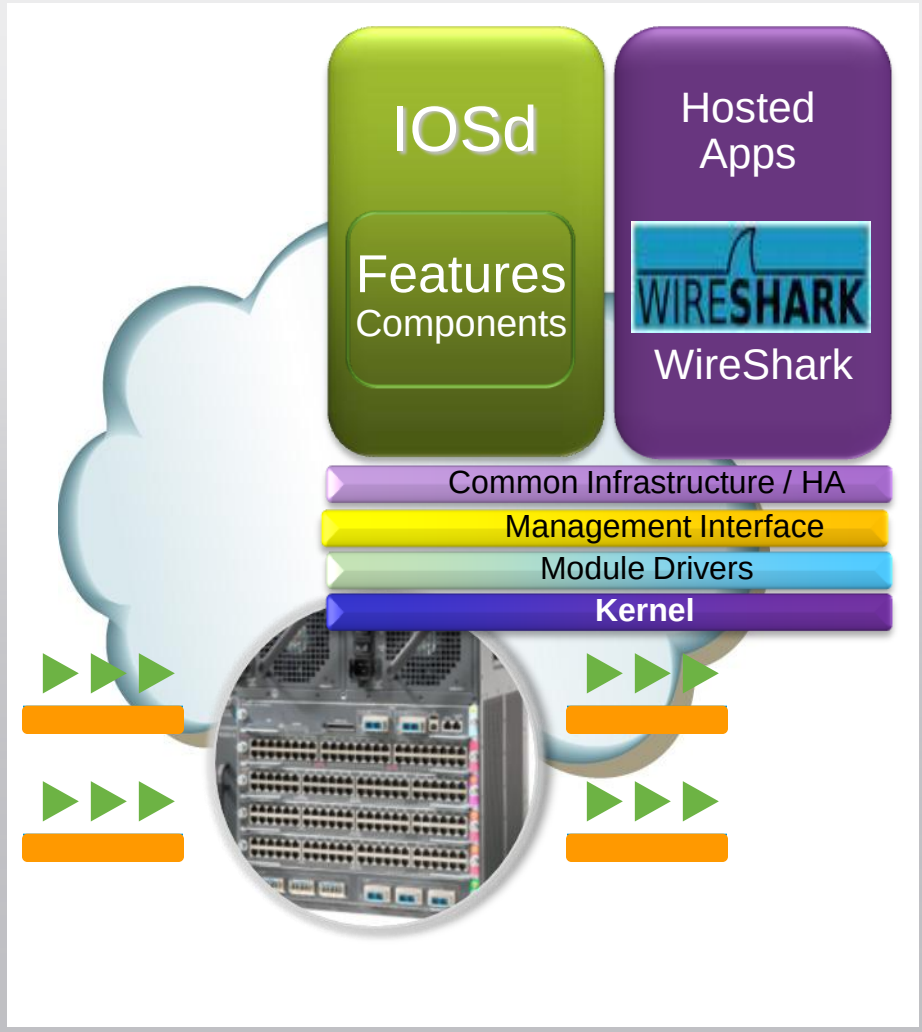
IOS XE Application Hosting Example
WireShark

Q2CY12



- Embedded WireShark application for real time traffic capture and decoding with customer-familiar user interface
- Simplified monitoring and troubleshooting
- WireShark hosted as a 3rd party application
- Leverages IOS capabilities for selective packet capture

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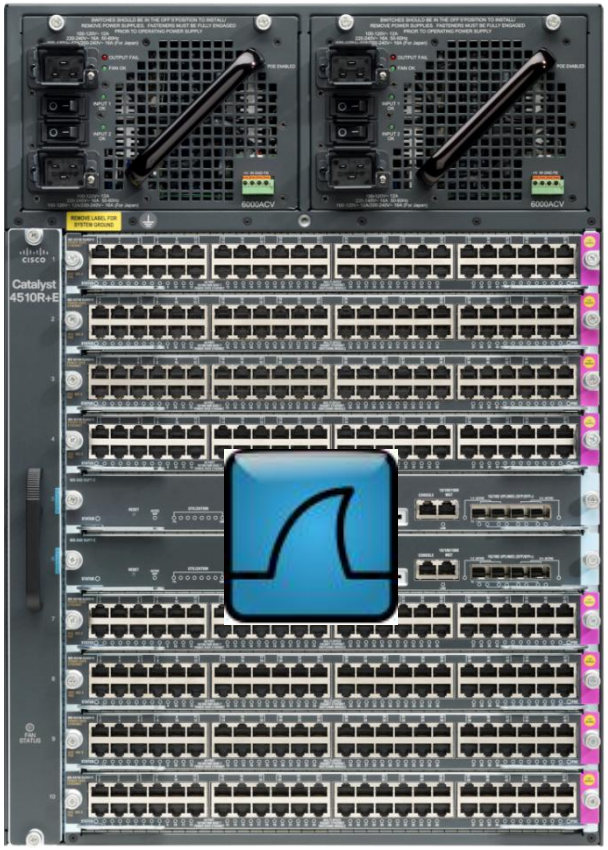
Wireshark Capabilities on the Supervisor 7-E



- IOS XE on SUP7-E can host third-party apps.
- Wireshark is a software process
- Capture filters
- Display filters
- Store packets in PCAP file that user can manually TFTP/SSH to remote server.
- Support for multiple active capture points

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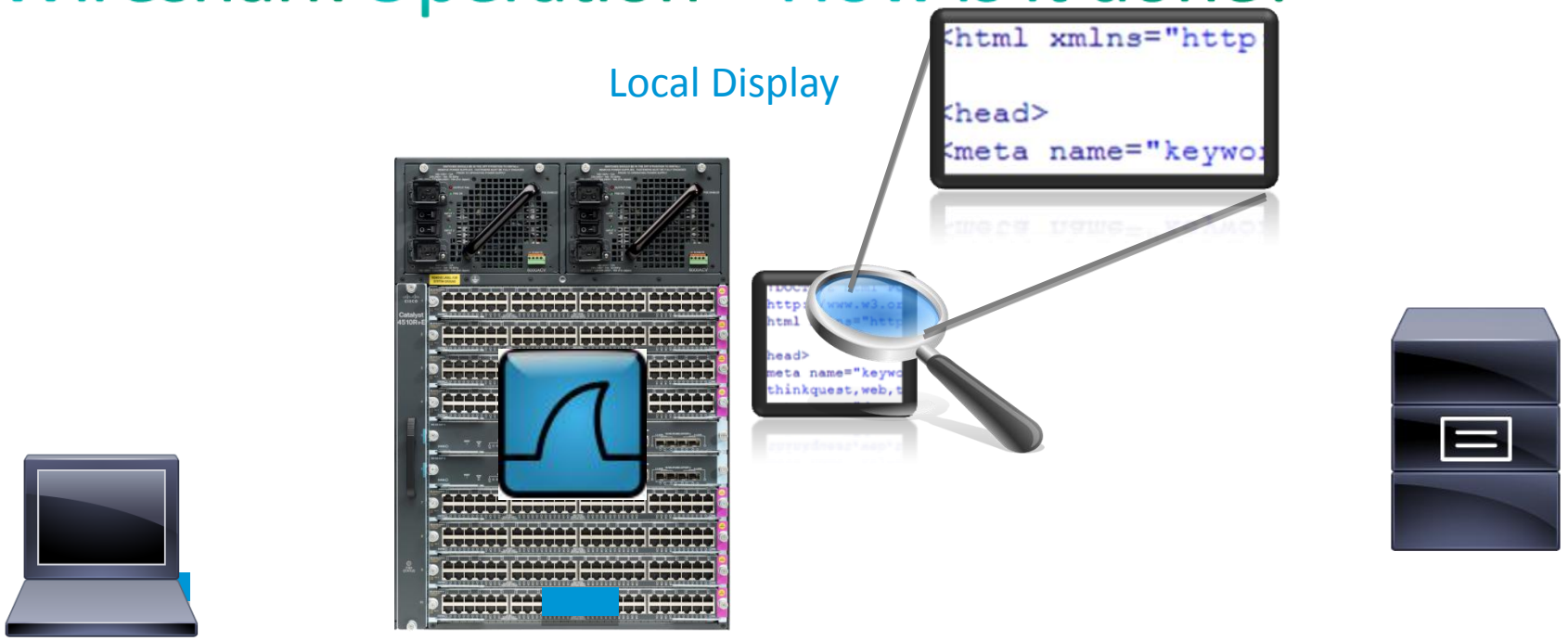
Wireshark Operation – How is it done?



- Original packets are hardware-switched to destination
- Copies of the interesting traffic are generated in hardware
- Processed by software at a rate-limited Packet per second, to protect CPU utilization
- The software interacts with the Wireshark module and writes the PCAP Files

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Wireshark Configuration

- Define Capture Point
  - What, Where to Capture From, What to do, When to Stop
- Attachment point (access, trunk, routed, Vlan, SVI, Portchannel, Control Plane)
- Directions (in/out/both) – Vlan is always bidirectional
- Multiple Capture Points
- Filters are associated with Capture Points
  - Core System Filter: applied in hardware, creates copies of “interesting” traffic
  - Capture Filter: applied in Wireshark in software
  - Display Filter: applied in Wireshark in software for decoding pcap files
  - Filters are independent of each other
  - Strong Core system filter is recommended to prevent unwanted packets being copied to software

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Wireshark Configuration Examples

- Simple Capture and Display

```
Switch# monitor capture point mycapture interface g1/1 filter ip protocol tcp
src 10.1.1.1 0.0.0.0 dest-port 80

Switch# monitor capture point mycapture start display brief
```

- Delete the Capture point

```
Switch# no monitor capture point mycapture
```

- Simple Capture and Store

```
Switch# monitor capture point mycapture interface g1/1 filter ip protocol tcp
src 10.1.1.1 0.0.0.0 dest-port 80 associate file bootflash:mycapture.pcap

Switch# monitor capture point mycapture start

Switch# monitor capture point mycapture stop

Switch# show monitor capture file bootflash:mycapture.pcap
```

- Display packets from a .pcap file with a display filter

```
Switch# show monitor capture file bootflash:mycapture.pcap display-filter “net
10.1.1.0 0.0.0.255 and port 80”
```

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Wireshark Buffer Capture

- Allows to capture packets and store them in a buffer:

```
monitor capture point mycap associate file location buffer
```

- Buffers can be cleared:

```
monitor capture point mycap clear
```

- Buffers can be paused:

```
monitor capture point mycap pause
monitor capture point mycap continue
```

- Buffer can be displayed:

```
show monitor capture buffer mycap brief
show monitor capture buffer mycap detailed
show monitor capture buffer mycap dump
```

- Buffer can be stored in a pcap file:

```
monitor capture point mycap store location filename
```

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Wireshark Output – Brief and HEX

- Display packets in brief mode

```
Switch# show monitor capture file bootflash:mycapture.pcap
  1 0.000000000  192.168.1.1 -> 192.168.1.10 UDP Source port: 59552  Destination port: 9995
  2 0.999453140  192.168.1.1 -> 192.168.1.10 UDP Source port: 59552  Destination port: 9995
  3 32.733140560 c8:4c:75:b4:0f:7f -> 01:00:0c:cc:cc:cc CDP Device ID:
4507_Sup7E_Access.cisco.com  Port ID: GigabitEthernet2/10
  4 34.999361760  192.168.1.1 -> 192.168.1.10 UDP Source port: 59552  Destination port: 9995
  5 35.999754880  192.168.1.1 -> 192.168.1.10 UDP Source port: 59552  Destination port: 9995
```

- Display packets in hexadecimal mode

```
Switch# show monitor capture file bootflash:mycapture2.pcap dump
      0000  00 00 94 00 00 04 00 00 94 00 00 03 08 00 45 c0   ..............E.
      0010  05 1e 0f 28 00 00 ff 11 24 35 c0 55 01 03 c0 55   ...(....$5.U...U
      0020  01 04 04 00 71 20 05 0a db 21 00 00 00 00 00 00   ....q ...!......
```

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Wireshark Output – Detailed

- Display detailed frame:

```
Switch# show monitor capture file bootflash:nflow.pcap detailed
Frame 2: 880 bytes on wire (7040 bits), 880 bytes captured (7040 bits)
    Arrival Time: Nov  2, 2011 03:21:13.992382490 Universal
<..SNIP..>
    Frame Number: 2
    Frame Length: 880 bytes (7040 bits)
    Capture Length: 880 bytes (7040 bits)
<..SNIP..>
    [Protocols in frame: eth:ip:udp:data]
Ethernet II, Src: c8:4c:75:b4:0f:7f (c8:4c:75:b4:0f:7f), Dst: e0:00:0a:61:4e:1a (e0:00:0a:61:4e:1a)
    Destination: e0:00:0a:61:4e:1a (e0:00:0a:61:4e:1a)
        Address: e0:00:0a:61:4e:1a (e0:00:0a:61:4e:1a)
<..SNIP..>
    Source: c8:4c:75:b4:0f:7f (c8:4c:75:b4:0f:7f)
        Address: c8:4c:75:b4:0f:7f (c8:4c:75:b4:0f:7f)
<..SNIP..>
    Type: IP (0x0800)
    Frame check sequence: 0xb2bffe02 [correct]
Internet Protocol, Src: 192.168.1.1 (192.168.1.1), Dst: 192.168.1.10 (192.168.1.10)
    Version: 4
    Header length: 20 bytes
    Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00)
<..SNIP..>
    Total Length: 862
    Identification: 0xc978 (51576)
    Flags: 0x00
<..SNIP..>
    Fragment offset: 0
    Time to live: 255
    Protocol: UDP (17)
    Header checksum: 0x6bba [correct]
<..SNIP..>
    Source: 192.168.1.1 (192.168.1.1)
    Destination: 192.168.1.10 (192.168.1.10)
User Datagram Protocol, Src Port: 59552 (59552), Dst Port: 9995 (9995)
    Source port: 59552 (59552)
    Destination port: 9995 (9995)
    Length: 842
Data (834 bytes)
```

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Wireshark Caveats

- Security:
  - Wireshark is run from IOS XE interface
  - Cannot invoke Wireshark directly
  - Wireshark runs in its own normal user space, hence no access to root user
  - Latest version will be bundled with a new IOS XE release to plug existing security holes in Wireshark
  - Wireshark crash does not take down IOS XE with it, so switch remains operational even if Wireshark does not
- Memory and Performance Impact:
  - 20-30MB usage in memory
  - The first instance will use more memory, while subsequent instances can share the same memory space. Up to 8 instances
  - Deleting a capture point, will exit the Wireshark process, and release memory back to the system
  - Interesting traffic is copied to CPU, hence this might be CPU intensive
  - The copied packets are policed via an internal policer in hardware, to protect CPU utilization, on a separate queue, out of the 64 queues
  - This might result in a not-so-contiguous packet capture

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